PRENATAL AND MATERNAL CARE

HUNTER

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TO MY WIFE

WHO HAS MADE THE PREPARATION
OF THIS BOOK A TASK
OF PLEASURE

PREFACE

The trend of modern obstetrics is to make childbearing more comfortable and less hazardous, to preserve health rather than restore it. For centuries the function of reproduction has been clothed in an atmosphere of mystery and surrounded by a veil of conventionalism that has resulted in unwarranted suffering and needless deaths. Modern obstetrics is no longer a subject of mystery, with gods and demons directing the forces of nature, but one of common sense based on scientific knowledge. The woman of the past trusted to the charlatanic methods of some ignorant midwife or to the kindness of Providence to "pull her through." The modern woman has recognized the benefits that are derived from proper care and is anxious to learn how she can avoid the many pitfalls that accompany pregnancy. She is asking questions that the busy doctor does not have time to answer in a satisfactory manner. It was an endeavor to supply this need that suggested this work.

This book has been written for the expectant mother who is anxious to know something about the physiology and hygiene of pregnancy. It has to do with the safeguarding of health, the development of the unborn babe, and the care and protection of the mother. There has been an attempt to describe the characteristics of a normal pregnancy and to teach the pregnant woman to recognize and watch for deviations from the natural condition. There has been no attempt to cover the field of obstetrics in detail, but to supply facts and information that the busy physician is unable to give. I have stressed the importance of competent medical supervision, throughout pregnancy, as the first and most important requisite.

In compiling this book I have derived much information from the "Obstetrics" by J. Whitridge Williams, "Principles and

Practice of Obstetrics,'' and ''Obstetrics for Nurses'' by Joseph B. De Lee, ''The Prospective Mother'' by J. Morris Slemons, ''Getting Ready to Be a Mother'' by Carolyn C. Van Blarcom, R. N., ''Expectant Motherhood'' by J. W. Ballantyne, and numerous pamphlets and booklets sent out by the United States Department of Labor. I am also indebted to Dr. G. M. Middleton and Dr. J. W. Giesy for advice and criticism in revising the manuscript and to J. W. Stacey of San Francisco for editing it.

INTRODUCTION

The reduction of the mortality attendant upon childbearing has been notoriously slow compared to that attained in many other fields, and any means by which this may be hastened must have the endorsement of all thinking people.

This reduction can be accomplished in two great ways: the education of all physicians as to what constitutes proper prenatal and natal care and the education of prospective mothers as to the proper standards of this same care.

The public is usually supplied with what it wants, and the demand from a great group of mothers-to-be for proper obstetrical attention, the demand being based on real knowledge of what proper attention means, will be an immense influence in producing a rapid improvement in the type of care furnished them.

Dr. Hunter, in this book, provides a clear explanation of the physiology of pregnancy and labor, and develops therefrom the methods of successful obstetrical practice. Every prospective mother should know these methods in order that she may judge of the care that she is offered, and by her search for proper attention increase the demand for competent obstetrical practice.

R. Knight Smith.

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PRENATAL AND MATERNAL CARE

CHAPTER I

PRENATAL CARE

Prenatal care in the strictest sense is the care of the child from the fertilization of the ovum, or beginning of life, to the moment of actual birth. It is a term now used by both the medical profession and the public as embracing both child welfare and maternal welfare during pregnancy. The health and development of the unborn child depend for the most part upon the health of the prospective mother. By surrounding the mother with the proper environment, both mental and physical, and by instituting proper hygienic measures during pregnancy we are able to safeguard her health and indirectly improve the health and decrease the hazards of the unborn child. Healthy mothers have healthy babies and healthy babies develop into the best parents. To insure the best surroundings for the rising generation is to safeguard the mother's health. It has been shown conclusively that conditions that destroy life also destroy health in those that survive.

Prenatal care has a direct bearing on maternal and infant mortality, morbidity, and invalidism. Ideal prenatal care should improve the health of both mother and child, rob childbirth of its terrors, and leave the mother with a desire to bear and rear normal children in an intelligent manner. In other words, mothers should terminate the period of reproduction in a healthy and happy state. Babies have a right to begin life with strong, healthy bodies and the state has already instituted means by which they may obtain the advantages of the best medical attention.

Since the discovery of the cause of contagious diseases the trend of modern civilization is to regard health as a problem of the

community rather than that of the individual. Health, like education, is an asset to any community both economically and socially. The unborn child is the foundation of the future nation and the healthier the child the richer the nation to which it belongs. Likewise, the health of the mother in rearing and guiding this future race should be considered seriously. One hundred and fifty years ago it was thought to be sufficient to be born free and equal, but today we believe it is every child's rightful heritage to be born into a healthy and intelligent community.

Every pregnancy has associated with it injury to the maternal parts and injury to the child itself. Tradition and ignorance are obstructing the progress of obstetrics by spreading the fallacy that childbearing is a physiological or normal process that needs no special care. Two-fifths of the deaths from childbirth are the result of such propaganda or of criminal carelessness. Childbirth is a pathological process and it should be considered as such. In the beginning it was more than likely a natural function without danger, but the struggle for existence, civilization, and concurrent diseases have so changed the human structure, that it should no longer be looked upon as natural or normal.

Evolution teaches us that the more complicated the racial structure the more complicated is the mechanism of reproduction. With the increase in mentality there has been a relative increase in the size of the fetal head and a corresponding increase in the difficulties of birth. It is the relative size of the child's head that determines for the most part the amount of injury to the mother at birth. The dislocation, congestion, and inflammation of the reproductive organs, particularly the uterus and bladder, following what is termed a "normal childbirth," stamp the function of reproduction as abnormal. Every woman has a certain amount of injury at childbirth, markedly so in first deliveries. Many women bleed to death, die of convulsions, sustain injuries that predispose to cancer, and suffer from many other disabilities because they have been pregnant. Childbearing is as pathological

in its effect as any other condition that damages, tears, ruptures, or stretches tissue beyond its physiological limit. Because such conditions follow childbirth there are a few persons who choose to regard them as natural; but however ignorant or bigoted they may be, if these same injuries occurred in the nonpregnant state they would not accept them as a normal or physiological process. For these reasons childbirth in the light of modern knowledge cannot, and should not, be considered normal in the sense that it is free from hazard.

Childbearing ranks second only to tuberculosis as the cause of death in women between the ages of fifteen and forty. Insurance companies do not consider pregnant women as first-class risks and will not accept them at the usual rate. Every day there is a vast amount of needless destruction that is the direct result of ignorance or carelessness. About 20,000 women die annually from childbirth or as a consequence of childbearing in the United States, and this constitutes but a small proportion of the true seriousness of childbearing, as most women suffer more or less from small injuries of which they never complain, and other women are operated on daily for the relief of old injuries. Two hundred thousand babies die annually in the United States at birth or during the first month following birth, and this is not the total death rate, since 25 per cent of all pregnancies terminate in abortion or miscarriage, a complication that is largely preventable.*

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* Louis Dublin has summarized the situation in the United States as follows:

1. "More than 7 women die from disorders of pregnancy or childbirth out of each 1000 confinements. This is equivalent to 1 maternal death out of every 140 confinements. (20,000 in 1920.)"

2. "Forty-five babies out of every 1000 births, or one out of every 22, are born dead. (About 112,000 annually.)"

3. "Forty babies out of every 1000 born alive die before they are one month old. (About 100,000 annually.)"

"Such are the dangers to mother and infant at the present time."

It is well to contrast this state of affairs abruptly with conditions that

The most critical period in the life of any individual is during the nine months before birth and the month following. And this is largely because the average woman accepts motherhood as a natural state and feels that she needs no special care. The United States had 55,000 men killed and 250,000 casualties during the Great War, and a great many more died from sickness. The country has not completely recovered from the horror of such needless destruction of life. Yet this is only a small proportion of what might have happened had not the army medical department taken great pains to prevent the spread of disease in the camps and among the fighting units. Dr. Eden of London says, "The Battalion medical officer in the field whose duty was to keep his men fit, to examine their teeth, to keep them clean, and to attend to their small ailments and complaints, was probably doing work as useful to his country as the surgeon performing brilliant operations upon men who were dangerously or hopelessly wounded." It is just as important in pregnancy, where two lives are to be considered and where the results are even more gratifying, to seek and accept such prenatal care as will prevent most of the serious complications that so often arise.

Fairs are held annually to show what can be accomplished by proper care and cultivation of plants and animals, and a great amount of time and money is spent by the government in aiding the farmer to raise better crops. Everyone agrees that the physical development of animals can be improved by proper feeding. Science has also proved that an arrest of development in animals can be brought about by feeding foods containing deficiencies in certain food elements. Statistics show that the children born of well-to-do parents are larger, stronger, and more vigorous than

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result *"among women who receive prenatal and maternal care under skilled direction."*

1. "Only 2 women instead of 7 die out of every 1000 confinements."
2. "Only 12 babies, instead of 45, are stillborn in every 1000 births."
3. "Only 10 babies, instead of 40, per 1000 born alive die before they are one month old."

the children of factory workers who are overworked and underfed during their pregnancies. In other words a well-balanced diet that contains all the food elements and vitamines will improve the health of the pregnant woman and indirectly improve the health and development of the child before birth and during the nursing period.

During the past twenty-five years the bulk of obstetrical progress has been along surgical lines, as a result of the recent knowledge of the value of sterilization and cleanliness in the prevention of infection. One hundred years ago hospitals were looked upon as pesthouses, 30 or 40 per cent of the patients dying during the epidemic. Maternal deaths due to infection have since that time been reduced to 7 per cent. At the present time statistics show that the risk of infection in the modern maternity hospital is only one-sixth of the risk of that in the home.

Fifty years ago doctors did not know how to detect and prevent serious complications. But scientific study and research have made conditions that formerly resulted fatally, preventable or curable. The nation at large is showing more consideration for the pregnant woman by legislation, by the establishment of free prenatal clinics, and by the encouragement of maternity hospitals. Insurance companies issue pamphlets urging expectant mothers to consult their doctors as "the first and most important thing to do." They realize the value of prenatal care and point out a safe and simple treatment that the patient should follow. If a physician is not available the patient is urged to accept advice of her graduate nurse, but never to consult her relations, who know little or nothing about modern methods.

Because of the present low standard of obstetrics the best minds in the medical profession have sought other fields where the nervous strain is less and the rewards greater. When the prospective mothers learn the value of good maternal care there will be more and better doctors who will specialize in obstetrics. As a general rule an article is worth approximately its purchase

price; a good pair of shoes will look better, wear longer, and be more comfortable than a cheap pair. This is as true in obstetrical care as elsewhere. Midwives will deliver babies at ten dollars and their services are frequently dear at the price. The public at large will pay a specialist a good fee for the removal of tonsils because the public has learned that the service of a trained man lessens the hazard of the operation and that the quality of the work is better. The public is willing to pay three or four times as much for a surgical operation, which requires less skill and responsibility, only because they have been taught that such cases do better in skilled hands. Hospital care is just as essential for the maternity patient who is desirous of the best results. Doctors may differ in the treatment of minor complaints, but in the serious complications medical opinion is much the same. Regardless of her race, creed, or social status the pregnant woman needs a doctor's supervision, and this care should begin as soon as the woman believes herself to be pregnant.

Ninety-nine chances out of a hundred, with good prenatal care, both she and her babe will come through the ordeal alive. But modern women are beginning to demand more than this. They have a right to demand relief from the terrors of childbearing, with the least possible injury to themselves and their child. The most permanent advance in obstetrics in the last decade has been the adoption of early prenatal care, which is only an outgrowth of the old antepartum examination that was found so advantageous. The intelligent mother with a meager knowledge of the normal conditions of pregnancy may detect something radically wrong with herself, but the early signs of existing complications are detected only by careful observation and frequent visits to a competent physician.

In the larger medical centers prenatal care has greatly reduced the incidence of convulsions, miscarriages, stillbirths, and injuries to mother and child. Greater strides cannot be made until the public realizes the value of health, the benefits of fresh air,

recreation, pure water, and good food. If a mother will take reasonable care of herself during pregnancy and lactation she will be able to lessen or remove most of the dangers of both periods, since 50 per cent of the deaths that now occur are quite preventable. It is gratifying indeed to know that each year more and more women are demanding knowledge concerning the important matter of reproduction. Women who are consulting their physicians earlier and reaping the benefits by following the simple rules of nature are rewarded with easier and more natural labor.

It is the things of life which we do not understand that cause us worry and anxiety, and childbearing has always been surrounded with an air of mystery. This anxiety is only increased by well-meaning relatives and friends who pretend to know "all" about childbearing and child raising by reason of having experienced it themselves. The number of miscarriages, difficult and disastrous terminations, should suggest to the young mother that she regard their harrowing tales as a warning rather than as advice. Many a bewildered mother has denied herself harmless pleasure which might have proved a diversion and actual benefit had she not listened to the unhappy experiences, false beliefs, and superstitions thrust upon her by unqualified persons.

Without doubt the reader has by this time become wearied with the enumeration of so many reasons for accepting prenatal care. But this has been done deliberately in the hope of impressing the mother with the value of proper care. There has been considerable progress in the prevention of injuries and complications of childbirth where the public has been taught that normal functions very often become abnormal and that pregnancy is a normal function that has become at least partially unnormal. In the past the tragedies that befell mother and child were dismissed as unfortunate and unavoidable accidents. At present, in the larger cities where prenatal care is given, the majority of women are confined within hospitals and will not accept doctors who do not give them proper attention or physicians who have frequent

obstetrical accidents. It is the combined efforts of both doctors and public that will place obstetrics on a higher plane and reduce the hazards of childbearing to a minimum.

IS A KNOWLEDGE OF OBSTETRICS DETRIMENTAL TO EXPECTANT MOTHERS? "The incessant thinking and worrying over what may happen is very apt to lead the highly sensitive woman into a state of actual despair." Such an expression is frequently used as an argument to dissuade or prevent the teaching of obstetrics to the pregnant woman.

A great many physicians contend that the study of anatomy and physiology of pregnancy is detrimental to the prospective mother, because of her tendency to become introspective. Physicians who limit their practice to obstetrics are convinced that an intelligent understanding of the physiology of childbirth will dispel the false ideas and fears that cause a great many women to look upon pregnancy as a curse rather than a privilege. It will also give the pregnant woman a comprehensive idea of the cause of disease and its method of prevention. This does not mean that every woman can become her own physician, but it is hoped that an intelligent understanding of the cause of disease will enable her to coöperate with the doctor and nurse.

One hundred years ago a mother would assert with an air of conceit that her first nine children had passed through the measles and scarlet fever, and add that the three youngest need not fear the outcome under her care and treatment. If one of the children became deaf from measles and another died later of kidney disease, she never dreamed that she was more than likely to blame for this condition. I believe that the modern woman has a right to know that scarlet fever may cause kidney disease, and that measles may cause deafness. I believe that the modern woman has a right to know that kidney disease may endanger her life if she becomes pregnant. Her duty to her children should be the knowledge of how to prevent them from contracting measles and

scarlet fever, and if one child has a contagious disease, that it should be isolated to protect the other children from a similar fate. It is the duty of every mother to know how to prevent disease, and how to interpret unusual symptoms that arise during pregnancy so that minor complications can be arrested before they become serious.

Medical science has increased the span of life at least ten years, and it has done this by teaching the public that certain conditions are harmful and should be avoided, and that certain unusual symptoms or discomforts are a forerunner of serious conditions that endanger life.

It is true, however, that the trend of civilization and the study of medicine tend to make a few individuals introspective and neurotic and actually unhappy. We all know intelligent individuals who worry about the normal palpitation of the heart and scrutinize every article of food before eating. But if we can save other individuals from dying from infection, or from convulsions of pregnancy, by giving them a better understanding of the physiology of childbearing, or if we can bring into life better and healthier babies, I feel that we shall have done our part.

CHAPTER II

ANATOMY AND PHYSIOLOGY

THE PLASTIC HEAD of the newly born child is more or less molded into a cylindrically elongated shape, because in the process of birth it has been forced through a rigid bony structure, called the pelvis. Previous to the writings of Andreas Vesalius, in 1543, the pelvic bones were believed to open or separate during the birth of the child. He demonstrated the fact that the pelvis must be regarded as an unyielding bony canal to which the fetus must accommodate itself during its passage. The intense pains of childbirth are for the most part the result of the force necessary to bring this about. The difficulty or ease of delivery, as may readily be seen, depends to a great extent upon the size and shape of this bony canal. It is for this reason that the physician measures the pelvis externally and internally to determine the best means of conducting delivery, when the time arrives.

A short description of the anatomy is given below in the hope that it may result in a better understanding of the process of labor.

THE PELVIS (Figure 1) is an irregular, cylindrical, bony structure peculiarly adapted in the female for the purpose of childbearing. It forms the bony support or bottom for the abdominal cavity. It consists of four bones: one large one on each side, called the innominate; a wedge-shaped bone behind, called the sacrum, and an unimportant tail bone, called the coccyx. These bones are firmly united by strong bands or ligaments which form a rigid bony support for the weight of the body, and for the protection of the organs of reproduction. During the later months of pregnancy nature slightly relaxes these joints in preparation for delivery of the child. Occasionally they become so relaxed that one bone slides upon the other and the patient suffers in-

tense pain in the bony part of the back and leg corresponding to the joint affected.

Because of the shape of the bones the pelvis is divided roughly into two cavities, a FALSE and TRUE PELVIS (Figure 1). It is the true pelvis with which we are directly concerned in childbirth. It forms the bony canal through which the child is forced

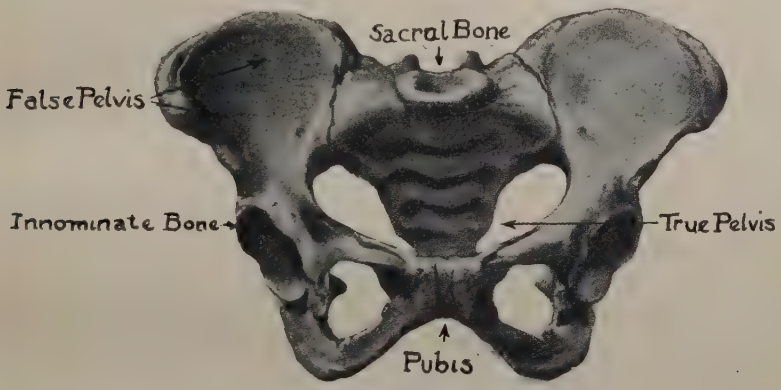


FIGURE 1. *Normal female pelvis.*

during birth. Because of its limited size, as pregnancy advances, the developing child within the uterus presses upward into the false pelvis and into the abdominal cavity, where it has abundant room for growth.

This true pelvis has two constrictions, one at the top, spoken of as the inlet, and one at the bottom, called the outlet. It is the passage or descent of the child at birth through these constrictions that causes most of the difficulties of labor. Nature has so planned the female pelvis that during this descent the average-sized, full-term baby should pass through the average or normal pelvis with little or no difficulty. Because of disease or improper development there is often a disproportion between the size of the child's head and these rigid constrictions so that the baby cannot descend without assistance. It is therefore very im-

portant for the physician to know beforehand the size and shape of the inlet and outlet, and by plans laid in advance to be able to prevent unnecessary injuries to both mother and babe. Often the pelvis is so small or distorted that a mature child cannot pass uninjured. In this case labor is induced prematurely, or delivery by abdominal incision (Caesarian section) is necessary. This may be accomplished with perfect safety if done before labor has begun.

The irregular projections and openings of the rough bony pelvis are covered over or lined internally with muscles, ligaments, connective tissue, and fat. These structures protect the large vessels and nerves, and make a smooth, soft birth canal. Covering all these structures is a smooth, shiny, glistening membrane, called the peritoneum, which gives the pelvic cavity, when empty, the appearance of a basin.

THE ORGANS OF REPRODUCTION

The organs of reproduction are probably the most interesting and the most studied part of the human body, for within each ovary is a portion of the mother cell out of which all of us have sprung. The ovum or egg is a living part of all of our ancestors and contains all of our hereditary qualities and sex characteristics. It is the only part of the organism that continues to live indefinitely. The inception of life within the uterus and its relationship to the mother has always been surrounded by mystery, superstition, and religious speculations. It was through the study of anatomy and physiology that their true function has been ascertained.

About the center of the true pelvis lie the three principal organs of reproduction, the OVARIES, UTERUS and FALLOPIAN TUBES (Figure 2). In the nonpregnant state these organs are so small that they can be held within the enclosed hand. In the healthy state they are freely movable in all directions and are loosely attached or suspended from the sides of the pelvis by liga-

ments that support and keep the organs in a central position. In front and beneath these organs lies the bladder, and behind are the rectum and the large vessels and nerves to the lower extremities. The reproductive organs are pressed upon from above by the abdominal viscera or bowels and are supported from below by the connective tissue of the muscles and ligaments which make up the floor of the pelvis.

THE UTERUS or **WOMB** is a hollow, pear-shaped, muscular organ which normally weighs about two ounces. Its cavity is triangular in shape and flattened anteroposteriorly, that is, from front backward. It is lined with a highly specialized, smooth, mucous membrane where the fertilized egg embeds itself and derives its nourishment during pregnancy. The lower point of the triangular uterine cavity terminates in an opening, called the *os*

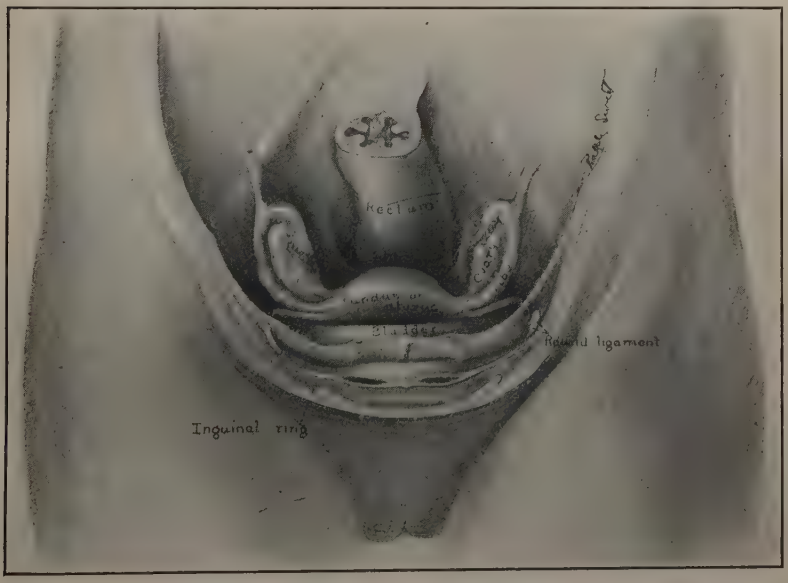


FIGURE 2. *Diagram illustrating the size and position of the organs of reproduction in the nonpregnant state.*

or *cervical canal,* through which the uterine secretions and menstrual flow are discharged. The two upper corners open on each side into the Fallopian tubes or oviducts.

The uterus is divided into two parts: a large portion above called the *fundus* or *body,* and a smaller part below called the *cervix* or *neck.* (The position of the fundus in its relation to the cervix determines the position of the uterus; thus, if the fundus is behind the cervix the uterus is said to be tipped backward or *retroverted.*) The cervix lies partially within a tubular canal (*vagina*) about five or six inches long which communicates with the exterior or external genital organs below. The uterus serves the purpose of a nest for the incubation of the egg or fetus before birth. It is also from the blood supply to the uterus that the child derives its nourishment and warmth.

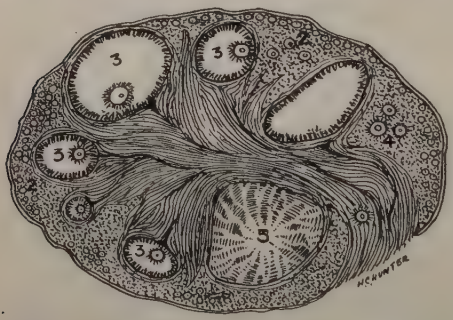


FIGURE 3. *Cross section of ovary. 1—Outer covering. 2—Ova in the early stages of development. 3—Ova in more advanced stages. 4—Ova in middle stages of development. 5—Corpus luteum.*

At the upper end of the uterus and branching laterally from each corner are the FALLOPIAN TUBES or OVIDUCTS which carry or guide the eggs from the ovary to the uterus. They are about the diameter of a slate pencil, about three to five inches long, and lined with a highly specialized membrane continuous with the uterine membrane. This membrane is rugged in its character and lined with tiny hairs (cilia) which roll the egg into the uterus for germination. The outer end of the tube is funnel-shaped and fringed with finger-like processes which give it the appearance of a grasping hand. The constant motion of the tiny hairs and the waving finger-like

processes suck or sweep the egg, after its discharge from the ovary, into the Fallopian canal and thence into the uterus. It is in this canal that the egg meets the germ cell of the male (spermatozoon) and is fertilized. Any inflammation or disease of the lining membrane of these tubes will naturally interfere with the fertilization of the ovum and the development of pregnancy. This is frequently the cause of sterility or of pregnancy occurring outside the uterus.

In close proximity to the outer end of the tubes, but entirely separate, are the OVARIES, which are the sex glands of the female (Figure 3). They are two in number and about the size and shape of almonds. The ovaries contain an internal secretion which has considerable influence on the growth and development of the individual. They also contain the eggs or ova from which new life develops.

PHYSIOLOGY

Between the ages of twelve and fifteen certain physiological changes take place in the female child which make her capable of reproduction. This ripening process is known as puberty or adolescence and marks the transition from childhood to womanhood. The individual, at this time, undergoes intense sexual development which almost completely changes her physical and mental makeup. The figure becomes more womanish, the hips broaden, the breasts develop, and hair appears over the pubis and under the arms. At the same time there is more or less nervous instability, and neurosis and psychosis are apt to develop. This is also the beginning of ovulation and menstruation so characteristic of reproductive life.

OVULATION is the rupture of the ripened ovum or egg and its expulsion from the surface of the ovary into the abdominal cavity. It occurs about midway between the menstrual periods. Each ovary of the newborn babe contains between 40,000 to

50,000 unripe ova or germinal seeds (Figure 3). None of these ova ruptures until after the age of puberty or adolescence, when they ripen one at a time and burst from the ovary about every twenty-eight days. Occasionally two or more ripen simultaneously and this is partly responsible for twins, but not the sole cause.

As the egg ripens it migrates to the surface of the ovary within a tiny sac which eventually projects from the surface of the ovary. When this sac bursts, its bed is filled with organized blood which later becomes known as the *Corpus Luteum* (yellow body). These yellow bodies exert considerable influence upon the uterus. Following menstruation they atrophy or become partially absorbed and give to the ovary a pitted or nutmeg appearance at the end of the reproductive period. If the woman becomes pregnant they persist through the pregnancy.

MENSTRUATION is a hemorrhage from the uterine which accompanies the partial casting off of the swollen and turgid lining of that organ. It occurs about every twenty-eight days throughout the reproductive life of the woman, except during pregnancy, lactation, or when some constitutional disease is present. Menstruation usually begins at thirteen and ends about the forty-fifth year. It begins earlier in warm climates and later in cold climates. (It is said that most Eskimo women menstruate only during the summer months.)

The uterus shows considerable activity just before each menstruation. At this time its blood supply decreases, causing it to enlarge and soften. The greatest change, however, takes place in the mucous lining, which becomes thickened and rich in nutritive material from the implantation of the fertilized egg. If the egg is not fertilized and therefore does not attach itself, this membrane becomes loosened, the blood vessels which supply it rupture, and menstruation begins. In other words the soil for the implantation of the fertilized ovum prepares itself every twenty-eight days, and if impregnation does not occur then the soil is

stirred up and a new field is prepared in anticipation for the next impregnated ovum.

The menstrual flow consists of degenerated uterine membrane cells, uterine secretions, and blood. The dismantling of this lining membrane usually takes from five to seven days, varying with different individuals. Before and during the flow the uterus contracts rythmically and in some individuals the contractions become so forcible that they cause severe pain similar to a miniature labor. Following menstruation there is a period of regeneration during which the uterus and the mucosa return to their normal condition. This period lasts from three to four days and is followed by a period of quiescence or rest for three or four days. During this time the ovary has prepared another egg and the whole process (menstrual cycle) is repeated regularly, usually every twenty-eight days, until sexual activity ceases.

The ovarian secretion evidently affects other parts of the body as well as the uterus, for menstruation is usually accompanied by general or constitutional symptoms. There is a congestion of most of the mucous membranes of the body, the nose, throat, stomach, and intestines. The temperament of the patient is frequently affected. One patient may become irritable and restless, while another individual may complain of languor, depression, and fatigue. Frequently the thyroid gland enlarges, and the breasts become engorged and tender.

CHAPTER III

PRENATAL DEVELOPMENT (EMBRYOLOGY)

IT IS ONLY NATURAL that an intelligent woman should want to know something of the development of the human organism that goes on within her own body. The study of the early development of life not only satisfies a great amount of curiosity, but takes the early development of the child out of the realms of the mystic and supernatural and places it on a firm scientific foundation. To the less intelligent, nature's handiwork will always remain a mystery because many people prefer not to know the truth. They are satisfied merely with the teachings of their forefathers and desire nothing more. It is true that some persons are made morbid by the disillusion from certain teachings of childhood, while others get joy and satisfaction from a comprehensive understanding of nature's processes. It is only a matter of time until the human mind adjusts itself to the new order of things and willingly accepts the natural laws that govern life. Biologic science does not deny the existence of a Creator. It simply places the beginning of life in a single cell rather than in a complex multicellular organism. The inception of life within the cell is still a mystery and will more than likely remain so.

HUMAN EMBRYOLOGY deals with the development of the human being from its beginning as a fertilized ovum to the mature infant structure at birth. For scientific purposes embryology is divided into three stages: ovum, embryo, and fetus. The product of gestation is called the *Ovum* during the first two weeks of life. From the second to the beginning of the sixth week of life, when the developing organism has assumed a definite form, it is called an *Embryo,* and after the fifth week and until the birth of the child it is referred to as a *Fetus.*

It is important for the pregnant woman to get a general outline

of the development of living organisms, because it gives to her a comprehensive understanding of the anatomy and physiology of her own body and a fundamental idea of the anatomy and physiology of the process going on within her. It will give her a clear understanding of certain congenital defects and conditions which the ignorant have attributed to some mysterious supernatural power. It is the key that will unlock the secrets of heredity, of determination of sex, of family traits, of insanity, and in part of the origin of the race.

The development of all animal life remained a mystery until the improved microscope revealed the structure and composition of tissue. New methods of fixing and staining tissue led to the ultimate detection and differentiation of cells and their composition. The evolution of embryology was a gradual process and fifty years elapsed before Gegenbaur demonstrated that the ovum of every vertebrate is a single cell.

The first morphological description we have of the beginning of early life followed the discovery in 1677 of the minute moving particles in the spermatic fluid, which were called seminal animalcules. These swimming objects were thought to be minute representations of men and women and were styled homunculi. They were said to enter the body of woman as a dwelling place and development was held to be simply a matter of growth or unfolding of this miniature man or woman, whichever the sex might be. Previous to this time the theory of spontaneous generation, or the belief that life suddenly appeared in slime and other putrid matter where no previous life existed, held sway.

For some time the body of man has been known to be made up of various tissues. Since the middle of the last century these tissues have been shown to be composed of tiny microscopical units called cells, which in turn are the derivatives or the daughter cells of an original cell called the OVUM, *Egg,* or *Germinal Cell.* The long journey that we all have taken from this single cell in the ovary to the mature product with all its complex

specialization of parts known as man is the revelation of science. How this transition from one cell to another occurs a million or more times without some disastrous mistake is a greater marvel than the sudden creation of man from dust or the creation of woman from a rib. What it is that makes one microscopical cell develop into a human being and another similar cell develop into a dog or a cat is something beyond the knowledge of man. The great revelations of the future will be in the comprehension of the inception of life within the first cell and of the creative energy which unites one cell with another and causes them to function harmoniously together as an individual. In the final analysis some supreme power or creative force directs the development of all living organisms. Something attracts the male cell to the unfertilized ovum and from the instant of fertilization until death this intangible energy continues to direct the structural and functional mechanism of life. In the adult structure, if the life of some particular cell or organ is threatened, there are other cells that stand guard and signal to still other cells to hasten to the rescue. If one cell is destroyed a new cell is immediately dispatched to take its place.

For the past one hundred years the CELL has been known to be the most simple element capable of living. In the lower forms of life, such as bacteria, this unit constitutes the whole individual. In man the cells live their individual lives. They eat, breathe, and excrete their waste products as individuals, but are welded together for a common purpose to serve as a unit. Microscopically the cell is composed of infinitely smaller elements of different value and chemical composition, known as protoplasm or cell substance, and near its center is a small round body, known as the nucleus, which governs its life. John Burroughs says, "The cell was the first invention; it is the unit of life—a speck of protoplasm with a nucleus. To educate this cell till it could combine with its fellow and form the higher animals seems to have been the aim of the creative energy. First, the cell, then combina-

tions of cells, then combinations of combinations, then more and more complex combinations till the body of man is reached, where endless confraternities of cells, all with different functions, working to build and sustain different organs—brain, heart, liver, muscles, nerves—yet all working together for one grand end—the body and mind of man."

The continuation of all forms of life is the replacement of old individuals by young individuals or old cells by new cells. This is known as reproduction and is accomplished by a simple process called *cell division* or *segmentation*, which is a separation of the cell into two nearly equal parts (Figure 4). These two new cells continue to grow as separate or combined units according to the type of organism to which they belong, and these in turn reproduce in a like manner until they produce millions of similar cells or one multicellular individual like the parent. In other words every new cell is a daughter cell or a portion of some other living cell and every new individual is a daughter or a living portion of its parent and likewise of its remotest ancestor. Individuals die but life goes on. Life is immortal.

As stated before, reproduction in the higher forms of life is relegated to special cells in the female ovary, known as ova, eggs, or germinal cells, and new individuals are developed from a union of two germ cells, one from the female (ovum) and another from the male (spermatozoon). This union or absorption of one cell by another is commonly known as *fertilization*.

The reason for this union is not entirely clear, but study of the lower forms of life has brought out certain facts. It seems that the continuation of the life of an organism is only possible when from time to time different elements that have been exposed to different influences combine with one another. Throughout all plant and animal life we notice that crossbreeding or bringing in a new strain produces a healthier and sturdier race. Even the most virulent bacteria, if allowed to grow indefinitely by themselves, will eventually lose their virulence and die. In other words,

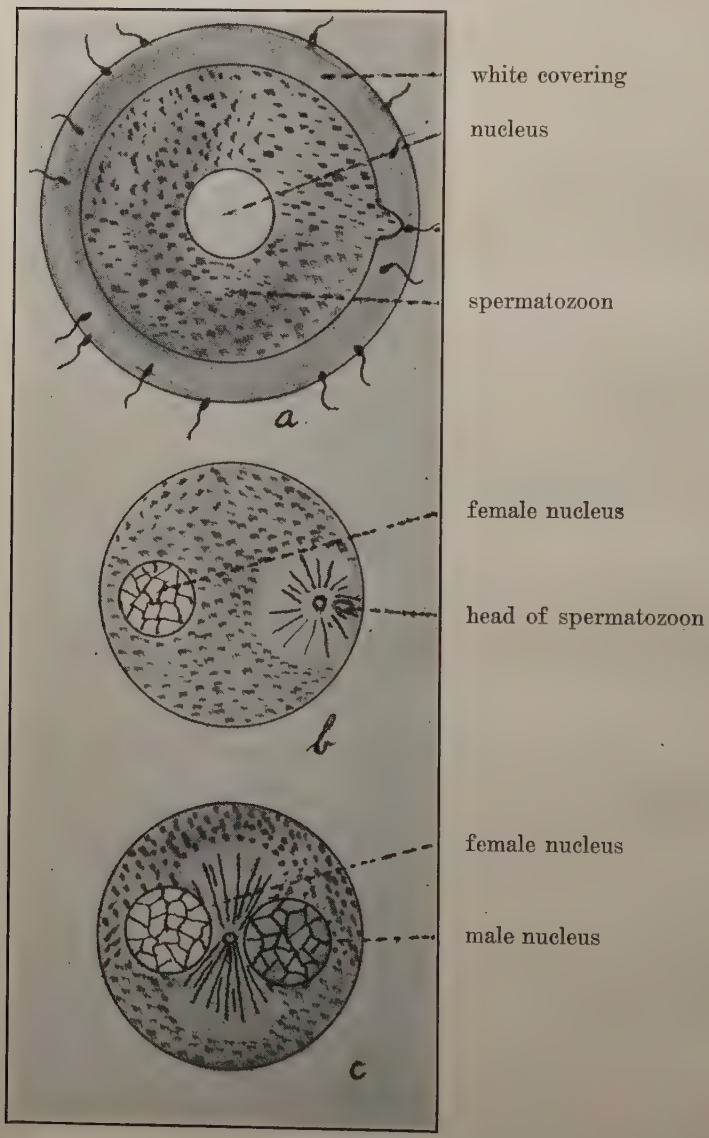


FIGURE 4. *Diagram illustrating fertilization of the ovum and first step in cell division.*

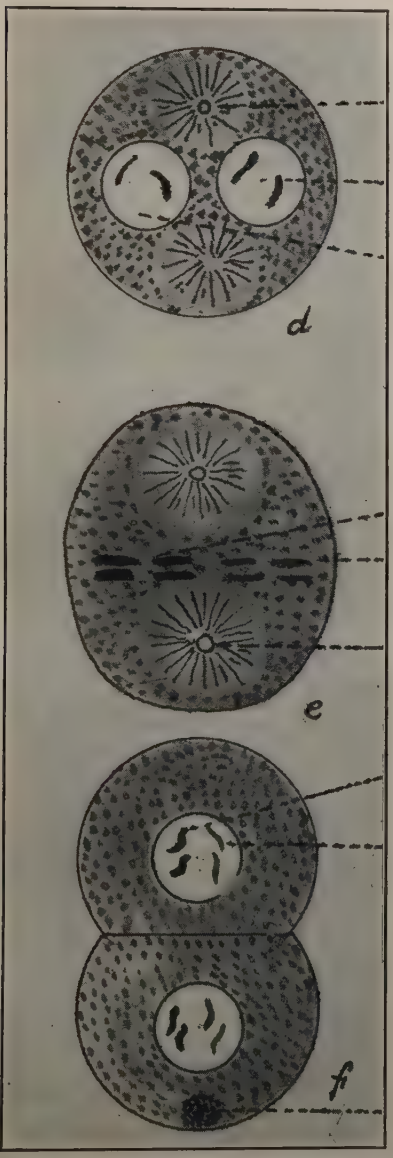


FIGURE 4. *Diagram illustrating fertilization of the ovum and first step in cell division.*

if life is allowed to continue indefinitely by simple cell division there is a progressive degeneration and eventually a disappearance of this species of organism. Apparently the fundamental principle that underlies the process of fertilization is a process of stimulation or activation and variation of the species. The old protoplasm of the ovum is reconstituted and rejuvenated.

We find that not all plants and animals require fertilization for reproduction. Trees can be produced from cuttings, and many insects (particularly the aphids) which have not been fertilized are capable of laying eggs which develop into complete individuals. But these asexual strains soon degenerate and disappear if reproduction is continued for any length of time without fertilization. This type of reproduction without sexual union is known as *parthenogenesis*. Among the higher animals, including man, there is no reproduction without fertilization because of their high specialization.

The human organism, like all forms of life, begins development as a single cell of the simplest anatomical type (ovum) (Figure 4a). When mature, this ovum, like any other cell, consists of a nucleus surrounded by nutritive material (plasma) held in spherical form by a delicate covering membrane. Within this tiny mass are the different elements that unite with the male elements to determine the sexual, racial, and hereditary characteristics of the individual. The susceptibility of disease and in rare instances the disease itself (insanity) is transmitted to the new individual through the union of the female and male nuclei. For some unknown reason nature has seen fit to allow the human female cell to remain inactive and eventually die unless it is aroused into activity by the germ cell of the male (*spermatozoon*, or *sperm cell*).

The meeting of the ovum and the spermatozoon usually occurs in the outer third of the oviduct or tube. Only the head of the spermatozoon which contains the nucleus enters the ovum. Its tail is lost and later absorbed. After entering the ovum the male

nucleus burrows to the female nucleus and there fuses. This fusion of male and female nuclei is called *fertilization,* or *conception.*

Fertilization and conception are synonymous terms, and the instant this occurs a new being springs into existence endowed with all the characteristics of its forebears. Anything which interrupts the progress of development after this stage destroys life. Formerly it was believed that life did not enter the body of the fetus until about the fourth month of pregnancy, when movement was felt by the mother. We know now that this idea is incorrect. There is life in the cell even before fertilization, but life as a distinct entity, as the law defines it, begins with the fertilization of the ovum. The fertilized ovum is, therefore, the total contribution of both the father and mother and no influence after this can affect its character any more than after birth. The mother is merely the house in which the baby lives, and the host from which it derives its sustenance. Anything that impairs the health of the mother may impair the health of the child, but it cannot *deform* the child physically or mentally.

The process of fertilization must necessarily occur sometime after intercourse; it may be only a few hours, or ten to twelve days. Although the ovum can be seen with the naked eye, the spermatozoon can only be seen by the microscope, being about one-third the size of the ripe ovum. Because of the long hazardous route to reach the ovum, nature has been very extravagant with the male cells. It is estimated that there are between 10,000,000 and 200,000,000 sperm cells deposited at the mouth of the uterus following intercourse. Only one spermatozoon is essential to impart the impulse of division to the ovum, and only one enters the ovum, the remainder die and are either absorbed or cast off with the vaginal secretions.

The spermatozoons (Figure 5) are minute cells with a large oval part called the head which contains the nucleus and an elongated part called the tail with which they propel them-

selves. When seen under the microscope they appear as swarms of microscopic tadpoles, with extra long tails, swimming actively and aimlessly in all directions. These cells are peculiar in that they always swim against the current. The cilia, or hairlike processes in the oviducts, set up a current toward the uterus and this current is continued through the cervix to the vagina, where the spermatozoids are deposited at intercourse. Strange to say these tiny cells have been endowed by nature to swim this long course against all obstacles in order to reach the ovum for fertilization. Consequently, anything which prevents the male cell from reaching the female cell necessarily causes sterility.

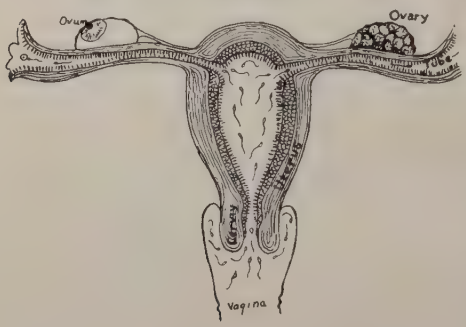


FIGURE 5. *Diagram illustrating the route taken by spermatozoons from the vagina to the ovum.*

Development of the Ovum.—No one has ever seen a fertilized human ovum during the first week of its development. There is a striking resemblance between the development of the human embryo and the development of the ovum of the orang-outang and gibbon; the chief difference in man is an acceleration of the enlargement of the brain at the expense of the body. It is from a study of the embryology of the orang-outang and the lower orders, particularly the chick, that we are able to assume the early development of man. After the second week, the actual development of the human embryo can be demonstrated. A general outline of the development is as follows:

After the penetration of the ripened ovum by the spermatozoon the nucleus of the male cell approaches the nucleus of the female cell and the two fuse and make one fertile cell (Figure 4e.) The new cell is now capable of dividing into equal parts, each part receiving half the hereditary elements of both male and female; therefore each cell is endowed with approximately half paternal and half maternal qualities and attributes. While this process of nuclear division goes on, the jelly-like protoplasm of the cell and

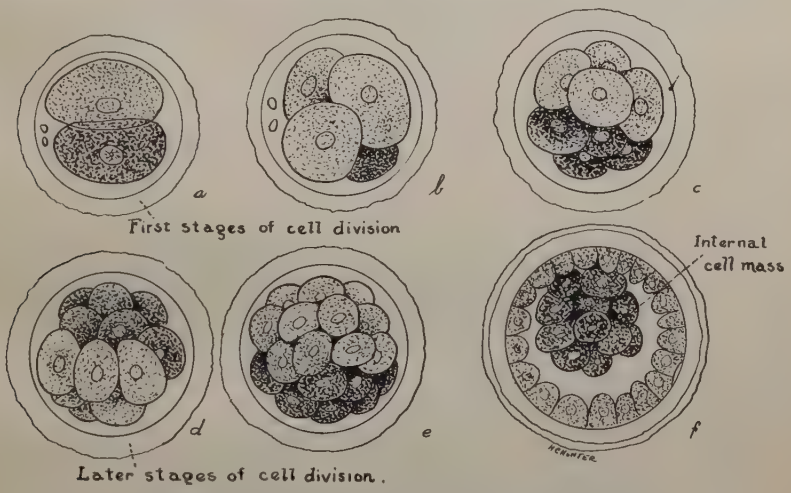


FIGURE 6. *Diagram illustrating cell division.*

the cell membrane also divide. Two new cells are thus formed and the first step in the beginning of a new individual has begun (Figure 6). Each daughter cell divides into two other daughter cells and so on. This dividing process continues until the original ovum becomes a small ball of cells, spoken of as the "mulberry mass" (Figure 6e). Fluid soon begins to appear in the center of the mass, forcing the cells to arrange themselves around the periphery like a hollow ball. At one point in the periphery, called the *embryonic area,* the cells begin to multiply faster than usual

and extend into the fluid cavity in a grapelike cluster. It is from these new cells that the embryo proper develops and the more sluggish cells left about the periphery develop into a new structure for its protection and nourishment.

While these changes are taking place the developing ovum is slowly moving down the oviduct. It can be seen that the ovum is in no way attached to the mother and that the mother has no influence upon its growth. It is estimated that it takes about one week to arrive at the uterine cavity. It is then about the size of a millet seed. During this time great changes have been taking place in the uterus. Its blood supply has greatly increased and the inner lining of the uterus (mucosa) has become much thicker and richer in nutriment than usual, and has a spongy, velvety appearance.

Embedding and Development of the Ovum.—After floating around in the uterine secretions and finding a suitable place to grow, the ovum burrows, buries, or embeds itself deep within the cells of the mucous lining of the uterus. The upper layers of the mucosa soon grow over and completely cover or embed the developing mass (Figure 7).

The ovum now undergoes a period of rapid development. The peripheral cells, like tiny roots seeking nourishment, grow outward, in all directions, and when they meet the dilated blood vessels in the wall of the uterus, they eat their way into them, thus allowing the maternal blood to wash their cells. The peripheral cells now form a shell-like covering, enclosing the embryo. The little rootlike processes (villi) lie free in the uterine vessels, which shortly dilate and enlarge into microscopic lakes, lacunes, or sinuses. It is here that the exchange of waste material from the embryo for the food material in the mother's blood takes place. The embryo virtually eats, drinks, breathes, and excretes its waste products through these tiny roots or villi. It can be seen from this description and must be continually borne in mind

that the embryo never becomes a part of the mother. In reality it is floating in the blood of the mother.

The blood vessels of the developing embryo soon push their way inside the little villi. The blood of the embryo therefore circulates inside the villi and the blood of the mother circulates outside. Thus it is seen from the beginning that the blood of the

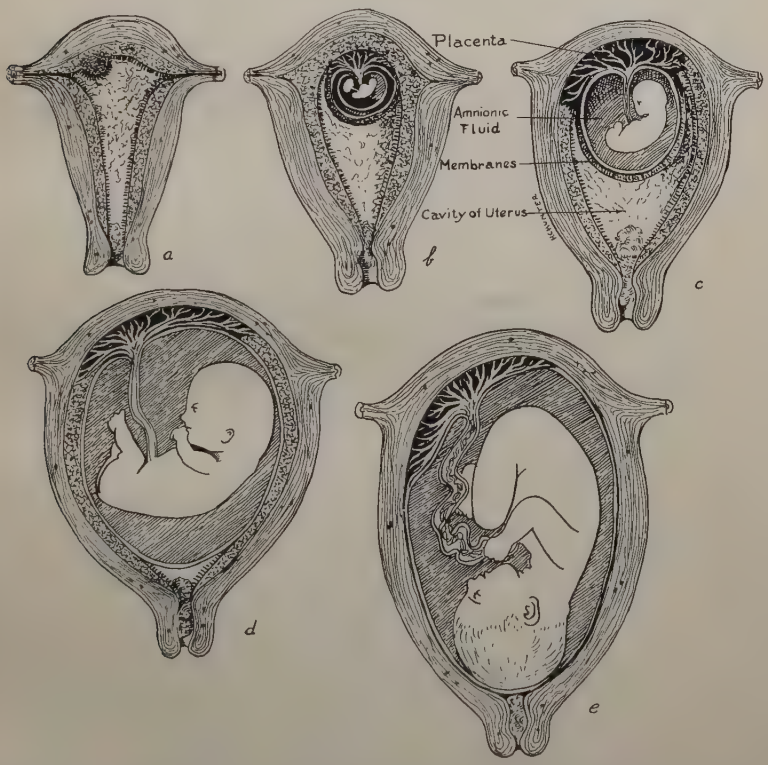


FIGURE 7. *Diagram illustrating the various stages of development of the ovum, embryo, and fetus. (a) Embedding of the fertilized ovum in the top of the uterus. (b) Development of placenta and membranes. (c) and (d) Further development showing increase in the amniotic fluid and placental growth. (e) Position of the fetus near term.*

mother and that of the embryo are distinct, and do not intermingle. The two circulations are separated by the thin layer of cells that cover the chorionic villi. There is definite evidence of this in women suffering from anemia, whose blood differs radically from that of the unborn child.

Rapidly the villi increase in number and complexity until the ovum looks like a half-filled ball covered with wet, shaggy fur. It soon increases in size until it becomes larger than the thickness of the uterine mucosa covering it, and bulges into the uterine cavity as a sprouting seed that raises the ground that once covered it. The villi that grow on the cavity side of the ovum now become exposed, receive scant nourishment and soon disappear, leaving a smooth, glistening sac, which later is spoken of as the *amniotic sac* or *membranes*. The uterine side of the ovum, or the side of the ovum in permanent contact with the mother's blood, must necessarily take up the additional burden of supplying nourishment and excreting the waste materials of the fetus. The villi therefore multiply with extreme rapidity to form a compact cakelike mass of highly developed chorionic villi called the *placenta*. Since this mass follows the birth of the child it is commonly referred to as the *"afterbirth."* The fluid in which the developing fetus floats and which is contained within the membranes is often spoken of as *"the waters"* and is technically known as the *amniotic fluid*.

From the above description we have learned how the impregnated ovum plants itself in the lining of the uterus. By the third week it has sprouted from this seedbed and begins to occupy the space in the uterine cavity. That portion which remains fixed in the uterine lining like the roots of a plant becomes the placenta. In other words the placenta, as we have already shown, is merely the better developed portion of the membranous sac which has taken up the burden of maintaining the life of the fetus. The chorionic villi at this point have developed into a superstructure only because they happen to be placed where the blood is richest.

The outer layer of the membrane is merely the degenerated portion of what might have been the placenta if the blood supply to the villi had not been completely destroyed by the growth of the fetus into the cavity of the uterus.

The average full-grown *placenta* (Figure 8) is a round fleshy mass about seven inches in diameter and one inch thick. Its size ordinarily depends upon the size of the child, the average placenta weighing one-sixth of the weight of the baby at birth, or a little over one pound. It is usually attached to the top of the uterus, near the opening of the tube whence it came, and is connected on the inner surface to the abdomen of the fetus by a cordlike structure called the *umbilical cord* or *navel string*. The surface attached to the uterus has the appearance of raw meat. When examined more closely it will be seen to be made up of countless numbers of tiny shreds of tissue, like the roots of a plant that cling to the soil. The opposite surface is covered by a thin, smooth, delicate membrane which is a part of the membranous sac, enclosing the fetus. The larger blood vessels of the placenta can be plainly seen through this transparent membrane. The smaller blood vessels of the villi can be seen to empty into larger vessels and the larger vessels in turn converge toward the center of the organ where they empty into the vessels of the umbilical cord.

FIGURE 8. *Placenta (fetal surface).*

It may be of interest to note that the placenta forms a protection for the child against disease. Since the maternal and the fetal circulation do not intermingle, only substances in solution are capable of passing from mother to child. The placenta, therefore, presents a barrier to germs and yet allows immune bodies to

pass from mother to child, which will protect the child against many of the infectious diseases. For example, if the mother should have typhoid fever, the fetus would not necessarily become infected, and yet might be immunized against the disease for some time after birth. This is one of the reasons why contagious diseases are so uncommon during the early weeks when such an infection would imperil the frail infant's life.

Amniotic Fluid or **"Waters"** (Figure 7).—This is the name given to the fluid in which the fetus is immersed during pregnancy. It is provided by nature to give to the fetus a freedom of movement which it could not otherwise possess. It prevents the child from adhering to other tissue which might interfere with the infant's proper development. In cases where the amniotic fluid is scanty we often find deformities, such as the loss of a limb or other conditions commonly called birthmarks, often erroneously attributed to some maternal impression. Where there is an abundance of fluid the child is well formed and the joints and muscles are flexible.

In addition to giving the fetus a better chance to grow, the amniotic fluid prevents the delicate child from being injured by blows upon the mother's abdomen. If the pregnant uterus were protected as are the mother's heart, lungs, liver, and brain, probably the child would not need this additional protection. A sudden blow upon the maternal abdomen would certainly injure the fetus if it were not shielded by something that would break the force of the impact. The amniotic fluid does this very nicely by equalizing the pressure upon the child in all directions. Besides providing room and protection from injury it also protects the child from sudden changes of temperature and tends to make the movements of the child less painful to the mother.

The amount of amniotic fluid varies within wide limits from one pint to four quarts, usually a little more than one quart. We do not know the exact source of the fluid, but it is believed by

some to be excreted by the fetus. It is very likely a product of both mother and child. It is cloudy in appearance and contains desquamated cells of the fetus and many of the substances found in urine. If death of the fetus occurs it becomes a dirty, dark brown color from decomposed material. The amniotic fluid is most abundant about the sixth month, but relatively greater, earlier in pregnancy.

The amniotic fluid is supposed to be of great value in dilating the mouth of the uterus (cervix) previous to the birth of the child. It is supposed to push into the cervical canal during the contractions of labor and act as a dilating wedge. It is very doubtful if this is true, since dilation of the cervix is brought about by contraction and retraction of the tissues about the cervix (thinning or effacement), drawing them up and away from the descending fetus. Labor can always be brought on, or hastened, by the rupture of the membranes. When rupture of the membranes occurs early in labor, the birth is spoken of as a dry labor. Dry labor gives the impression of being longer simply because it initiates major uterine contractions at once, whereas in normal labor thinning and dilation of the cervix usually begin a week or more before painful contractions are felt by the mother. A pint or more of serous fluid may accumulate between the membranes and the wall of the uterus and escape on dilation of the cervix. This is known technically as hydrorrhea gravidarum and is very frequently mistaken for rupture of the membranes themselves. It is almost always a sign of impending labor. Rupture of the membrane does not normally occur until dilation of the cervix is effected. As a rule, after rupture of the membrane the contractions increase in intensity and the birth of the child soon follows.

Umbilical Cord.—The umbilical cord is the connecting link between the fetus and the placenta. It is merely an extension of the blood vessels of the fetus into the placenta. The umbilical

cord is about one and a half to two and a half feet in length, about one-half inch in diameter, and contains three vessels, two of which carry the blood of the fetus to the placenta or chorionic villi for exchange of food and waste products; the third returns the enriched blood from which the child receives its nourishment. The vessels are protected and surrounded by a jelly-like substance (Wharton's jelly) and held together by connective tissue. If it were not for the umbilical cord the movements of the child would be restricted. It is therefore sufficiently long to allow the child freedom of movement and to permit it to be born without disturbing the attachment of the placenta. There are great variations in the length of the cord. Occasionally it is so short that the child cannot be born without severing it. At other times it is three or four times longer than necessary and wrapped several times about the child's neck. Compression of the cord or interference with the blood supply before birth, unless relieved, causes death to the fetus.

Bleeding from the umbilical cord is evidently bleeding from a fetal blood vessel and is serious to the life of the child. Bleeding from the placental site before birth is serious to the life of the mother because the blood comes from a maternal blood vessel. Such bleeding is also serious to the fetus because it diminishes the supply of oxygen and the exchange of nutritive material.

In the preceding chapter we left the ovum as a double-walled, slightly shaggy vesicle filled with fluid, with a grapelike mass of cells extending internally from a point on the periphery. It is the development of this grapelike mass of cells, the embryonic body of the child, which we shall now briefly endeavor to trace.

At the end of the first lunar month (Figure 9) (four weeks) the embryo and its attachment lie coiled up in a small sac about the size of a small pecan or pigeon's egg. It has a recognizable head-end which even now shows the characteristic enlargement of the human embryo. The rudiments of the eyes, ears, and nose can be seen as depressions and the extremities are seen as small buds

or stumps protruding from the side of the body. The heart, liver, kidneys, and intestinal canal are beginning to form and can be made out. The embryo at this stage has a well-marked rudimentary tail and open branchial clefts, like the gills of a fish.

At the end of the *second month* (Figure 9c) (eight weeks) the embryo and sac are about the size of a large hen's egg. The external ears and eyelids appear. The extremities are now divided

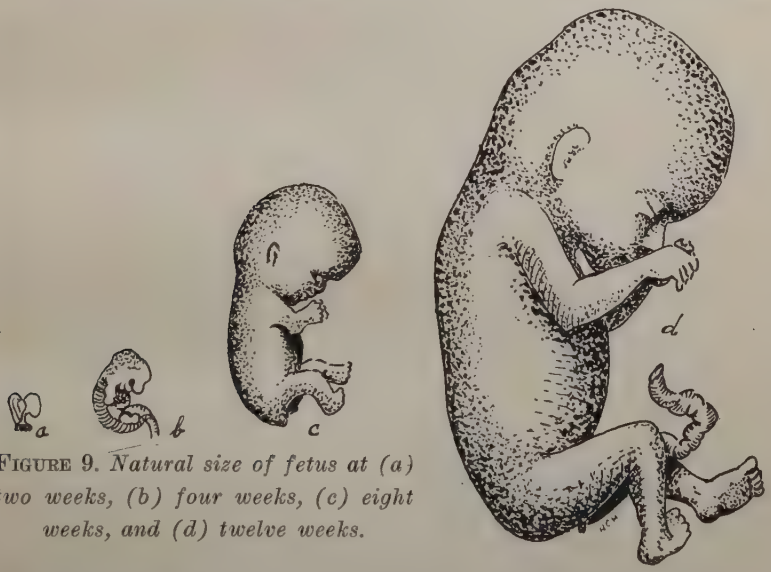


FIGURE 9. *Natural size of fetus at (a) two weeks, (b) four weeks, (c) eight weeks, and (d) twelve weeks.*

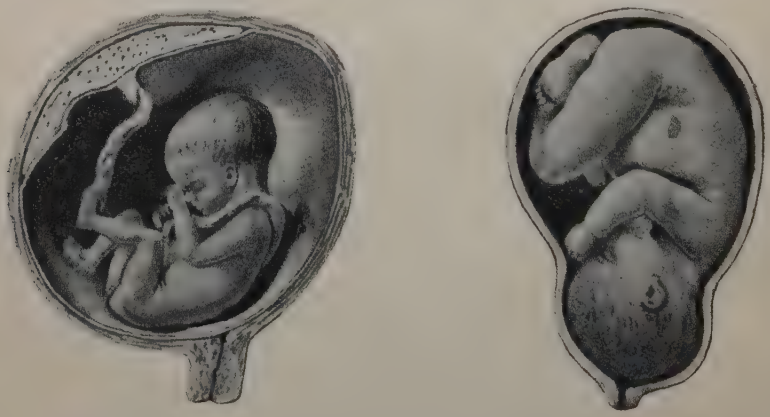
into three parts: thigh, leg, and foot; or arm, forearm, and hand. The tail-like process has disappeared, but the genital tubercle from which the sex organs are derived is prominent. The new organism has now passed from the purely embryonic stage into fetal life. Its many transformations in structure have passed and from this time onward the future life of the unborn infant is growth. No one would fail to recognize it as a human creature at this time.

At the end of the *third month* (Figure 9d) (twelve weeks) the

fetus is about the size of a large goose egg and about three and a half inches in length. The genital organs are alike in both sexes. At this stage the fetus resembles a miniature brownie with a protuberant abdomen and a very large head.

At the end of the *fourth month* (sixteen weeks) the muscles have developed so that the fetal movements can often be felt by the mother (life) (quickening). The sex can easily be determined, and fine hairs, like down (lanugo), appear all over the body surface.

At the end of the *fifth month* (Figure 10a) (twenty weeks) the fetus swims freely in the amniotic fluid and is about a foot in length when extended. The hair or "down" on the body is more prominent and the skin has a translucent reddish appearance. Hair on the head begins to appear and the face has a "senile" or old-mannish look due to the absence of fat in the skin. Very



(a) (b)

FIGURE 10.

(a) Relation between the size of the uterus and fetus at fifth month (one-sixth natural size).

(b) Adaptation between the uterus and the fetus at term, in vertex presentation (one-sixth natural size).

often when born at this stage the fetus will make attempts at respiration.

At the end of the *sixth month* (twenty-four weeks) the fetus weighs a little over one pound, and the body is somewhat better proportioned. The child if born at this age may, under favorable conditions, live for several hours, but since the digestive organs are undeveloped it soon dies from lack of nourishment.

At the end of the *seventh month* (twenty-eight weeks) the fetus weighs about two and a half pounds, and looks more or less like a miniature old man with a disproportionally large head. At this stage the lungs are fully developed but the cry is weak. These children rarely survive.

At the end of the *eighth month* (thirty-two weeks or seven and a half regular months) the child weighs about three and a half pounds; its body is still covered with fine hairs and a white greasy material (vernix caseosa), a product of the sebaceous glands, covers the body and protects the skin. The genitals are well formed and the bones of the head are soft and flexible. Such children may be saved if given proper care.

At the end of the *ninth month* (thirty-six weeks) the baby weighs about five and a half pounds; the hair on the body begins to disappear. The hair on the head becomes more prominent, and the finger and toe nails are more firm.

At the end of the tenth lunar month (280 days) (Figure 10b) the unborn infant should weigh about seven and a half pounds and present the characteristics of a mature baby. At this time it completely fills the uterine cavity and assumes a definite position for birth. When born it should breathe freely, cry vigorously, move actively, and take the breast readily.

THE NORMAL BABY AT BIRTH

The average weight of the full-time child at birth is a trifle over seven pounds. Boys as a rule are three or four ounces heavier than girls. This weight is by no means constant, depend-

ing on the size of the parents, the health of the mother, and the duration of pregnancy. First babies as a rule weigh less than subsequent babies, only because labor is frequently a week or ten days earlier; otherwise the weight is practically the same. The length of the child is really a closer estimate of its age than the weight, but it is not a better index as to its ability to survive.

During the later months of pregnancy there is rapid increase in weight, particularly the deposition of fat beneath the skin. It has been estimated that 80 per cent of the weight at birth is gained in the last four months of pregnancy. Nature has provided the mature infant with a blanket of fat which may be used as food in times of need, and protection against the cold. In the premature infant there is a deficiency of fat beneath the skin and the child is more likely to be injured at birth, may suffer from lack of nourishment, and most of all suffers from exposure to sudden changes in temperature, because of this fact. If the premature infant is not given the most careful attention it is either too hot or too cold, and sudden changes in temperature produce shock and death.

Grandparents frequently assert that the babies of today are considerably smaller than the babies of their generation. They will assert with all sincerity that it was not uncommon, twenty-five years ago, for babies to weigh from ten to fifteen pounds at birth. This fallacy or misconception was probably the result of the careless method by which they determined the weight of the baby. It was their custom to estimate the weight of the child by "hefting." As everyone knows, mothers are flattered by the birth of a large baby, and midwives, in their endeavor to please, had a tendency to overestimate. As a matter of fact, babies weighing more than twelve pounds cannot be born in safety, and babies weighing from fourteen to fifteen pounds cannot be born alive. Rarely do babies actually weigh more than nine and a half pounds, and these children should be considered post-mature, that

is, the pregnancy has continued more than ten lunar months (280 days).

The number of questions that a new mother will ask concerning her child after birth is very surprising. The foremost question in the mother's mind, and that which is almost universally asked, is, "Is my baby all right?" Practically every mother worries subconsciously about the outcome of her offspring. Even after being assured that there is nothing abnormal, other questions follow from day to day concerning the nature of this or that particular detail.

It should be observed that the physique of the newborn infant differs greatly from that of the adult (Figure 11). Its head is larger in circumference than either chest or abdomen. The arms and legs are relatively short, the navel being about midway between the crown of the head and the soles of the feet. The skin is soft and velvet-like because of the generous deposit of fat beneath. The skeleton is more flexible. The bones have not hardened, being mostly made of cartilage, and many remain separate for some time after birth. The joints are loosely connected by fibrous material. The legs are slightly bowed, due to the intrauterine posture of the child. This should not be mistaken for the bowing in later life, which is a result of faulty nutrition and not, as many mothers think, a result of standing too early. The hair on the head may be absent or thick and long. Its color and texture

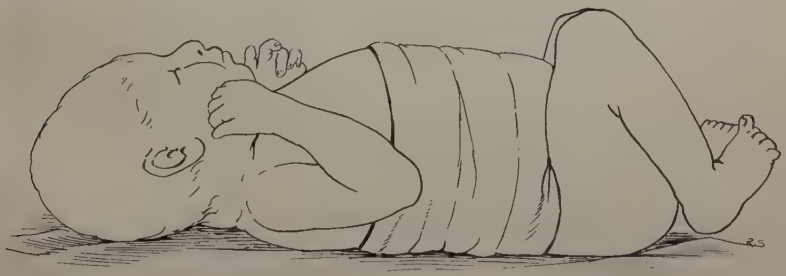


FIGURE 11. *Characteristic position of a newborn babe.*

have no bearing on the ultimate color. Frequently there is a growth of fine hair over the shoulders and back. The eyes are usually of a slaty blue color.

The shape of the child's head gives the new mother most concern. Previous to birth it is well proportioned, but during its passage through the rigid, bony pelvis it becomes distorted into an elongated negroid shape. The nose is flat and the forehead is low and slants backward into the rest of the skull.

The amount of distortion depends on the amount of difficulty at birth. As everyone knows, the bones of the child's head are soft and have not fused with one another. During the passage of the head through the pelvis, they overlap each other and the soft tissues are stretched to fit the temporary deformity. If the labor has been prolonged and difficult, an infusion of fluid frequently collects in the tissues at the crown of the head where the pressure is the least. This fluid tends to accentuate the distortion and is technically known as *caput succedaneum*.

This distortion need not cause the mother any concern, as it is only a matter of time until these changes will all pass off. Massage and bandages are of no use whatsoever and may even do harm.

CHAPTER IV

SEX, TWINS, HEREDITY, SUPERSTITION, AND MATERNAL IMPRESSIONS

DETERMINATION OF SEX.—Throughout the history of the world this question has perplexed the human mind, and science is still struggling with the problem. In the beginning an explanation was attempted on the basis of magic, superstition, and religion. As yet medical men have not fully agreed on what produces one sex or the other. At the present time it seems that if the question is ever decided it will be accomplished by a more careful scientific study of the early development of the ovum.

More than five hundred theories have been advanced and subsequently discarded. The most prevalent theory among the laity today has been handed down from the past generation and is based upon the erroneous idea that impregnation and intercourse occur simultaneously. It was believed that if intercourse occurred just prior to menstruation a boy would be born, and if intercourse occurred just following menstruation a girl would result. We now know that ovulation occurs about midway between the menstrual periods and that impregnation occurs from a few hours to two weeks afterward. The time of intercourse, therefore, has nothing to do with the determination of the sex. Another theory was based upon the erroneous idea that the left ovary produced girls and that the right ovary produced boys, so that by lying on one side or the other immediately after intercourse the desired sex could be obtained at will. We know this to be a fallacy, because women who have had one ovary removed by surgery bear approximately an equal number of boys and girls. Again many women have attempted to influence the sex of the child by diet, etc., on the basis that both sexes are present during the early weeks of pregnancy. It is true that both male and female sex organs are present during the early period of the

embryo and that as development goes on one sex or the other asserts itself. It is also true that the rudimentary sex organs of the male can be found in the adult female and the undeveloped female organs can be found in the adult male. It has also been shown experimentally that insects subjected to chemical or nutritional disturbances in the early formative stages develop into hermaphrodites, that is, they have an imperfect development of both sex organs and are neither one sex nor the other. The adherents of this theory endeavor to produce the desired sex at will by eating certain food, by following certain prescribed exercises, and by practicing a considerable amount of hope, faith, and prayer. In practice the adherents of this theory eventually fall into two groups of equal size, those who are fortunate in getting the sex they desire and those who are sadly disappointed. In other words the theory may be all right, but in practice it apparently fails to work.

There is abundant proof to show that the sex of the embryo is determined at the time of impregnation or fertilization of the ovum, and not by some external influence during its early formative stage. Careful study of the development of the lower animals has shown that the cellular elements (chromosomes) of both the male and female nuclei are more than likely the carriers of hereditary tendencies and sex qualities and that the sex of the child is the product of the predominating number of sex elements of the two nuclei that fuse.

At the time of the marital relationship there are deposited equal numbers of the sperm cells predominating in male or female chromosomes with sex characteristics. It is simply a matter of chance which spermatozoon reaches the ovum first. If this theory be true it clearly indicates that there will always be about the same number of boys and girls born, and that the mother will never be able to control the sex of her child.

CAN ANYONE TELL THE SEX OF THE CHILD BEFORE BIRTH?—The answer to this question is in the negative. Throughout the world there are approximately 105 boys born to every 100 girls. Anyone who attempts to predict the sex of the child before birth is simply guessing. There are no positive means of determining the sex before birth except by seeing or feeling the sex organs.

Of late years there has been a belief that the sex of the child can be ascertained by counting the fetal heart rate. This theory is based on the assumption that large babies have a slower heart rate than small babies, and that boy babies as a rule are larger than girl babies. As a matter of fact the percentage of boy babies that weigh more than girl babies is small and the fetal heart rate in large babies is frequently more rapid than that of small babies. Because of these exceptions the theory is of no value. Experience teaches us and statistics prove that this rule is only correct in about 50 per cent of the cases. It is just as satisfactory to toss a coin to determine the sex, before labor begins, as it is to follow any other assumption to date.

Often doctors resort to subterfuge by asking the patient which sex is desired and then predicting the opposite sex. If the guess proves correct the physician is proclaimed a prophet, but if the guess be incorrect the mother is so pleased with the result that his mistake is entirely overlooked. It is said that a very crafty midwife, whose skill was only equaled by her prophetic powers, when asked to predict the sex of the child would emphatically state that the baby was one sex and jot down in her memorandum the opposite sex. If the child proved to be of the sex that she asserted she was proclaimed a prophet, but if the child proved to be of the opposite sex she consulted her memorandum and thereby proved her wisdom.

TWINS OR MULTIPLE PREGNANCY.—Twins occur approximately once in a hundred cases and triplets once in seven

hundred cases. More than three babies at one confinement is extremely rare, but as many as six have been known to occur. It is a well-known fact that certain women are predisposed to multiple pregnancies. Of late years it has been shown that this tendency can be transmitted through the father as well as the mother.

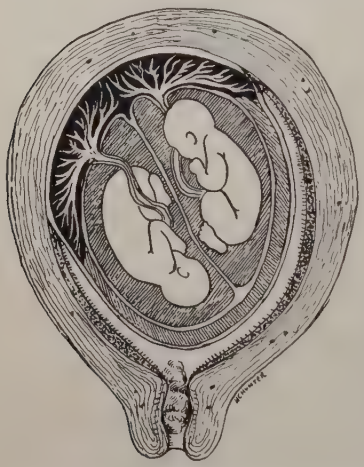


FIGURE 12. *Homologous or identical twins.*

Twins are of two kinds: those which are the result of the fertilization of two separate ova by two separate spermatozoa, and those which result from the fertilization of a single egg (Figure 12). The former are ten times more frequent than the latter and may be of different sex and do not necessarily resemble each other any more than any other brother and sister, except that they are of the same age and development. The single ovum twins are called homologous twins, or identical twins. They are always of the same sex and show great similarity at birth and throughout life. Deformities are also more common in this type, and when they occur they are identical in both infants. The cause of homologous twins has been explained upon the theory of the separation of the fragments of the egg during one of the early divisions of the cell. It has been experimentally shown in the growth of the sea urchin that if the ovum is disturbed after segmentation has begun and the parts become separated, the individual parts will continue to grow and produce normal sea urchins.

The diagnosis of twins is extremely difficult in early pregnancy, but near the end of gestation it is usually easy because

the size of the uterus is always out of proportion to the length of the pregnancy. This rapid enlargement usually causes considerable distress to the mother by abdominal distension. Swollen feet, varicose veins, and toxemias are more common. A definite diagnosis of twins can be determined only by hearing and counting two hearts of different rate. After the seventh month the X-ray will show the shadows of two babies. Twins are practically always born prematurely and therefore are underweight, but the sum of their combined weight is greater than that of the child of a single pregnancy.

HEREDITY, SUPERSTITION, AND MATERNAL IMPRESSIONS.—As shown in a previous chapter, the child's inheritance is fixed at the time of conception, when the male and the female nuclei fuse to form the new individual. The inherited characteristics, traits, or other qualities are implanted in the germ plasm of the new being at this time. It has been shown by animal experimentation that animals who have had their ovaries removed and ovaries from another animal transplanted in their stead inherit the physical and mental characteristics of the animal to which the transplanted ovaries belonged. In other words, if a large white guinea pig has its ovaries removed and the ovaries of a small black guinea pig are transplanted in their place, the offspring will inherit the black coat and the small stature of the black pig. Such an experiment proves beyond a doubt that the hereditary qualities are contained within the egg and are not due to or changed by some maternal influence. It is true that children of the same parents differ widely in physical and mental characteristics. This has been explained by the manner in which the ovum and spermatozoon ripen. By some selective process one-half of the cell elements (chromatin) which contains the inheritable qualities is cast off from both the ovum and spermatozoon in their process of ripening. Whatever it is that determines which elements shall be thrown away and which shall be saved

is unknown; at any rate the fusion of the retained chromosomes is that which makes up the inherited characteristics of the new individual. This view is in accord with twin pregnancies of the homologous type. Such twins come about as a result of a fracture of the dividing egg after impregnation has taken place and therefore after the sex characteristics have become fixed. They are, therefore, always of the same sex and so much alike that even the mother has difficulty in distinguishing them. These twins are temperamentally and emotionally alike. They differ only because of differences in nutrition or environment; since no two individuals ever receive exactly the same quality or quantity of food, neither can they be placed in exactly the same environment.

MATERNAL IMPRESSIONS. — The popular notion that the mental state of the mother can influence her unborn child in mind or body is so well fixed in the minds of young mothers that it cannot be dismissed as wholly absurd without a word of explanation. We do know that children resemble their parents physically, mentally, temperamentally, and emotionally, but these qualities are either inherited or come about through environment. Statistics tend to prove that intellectual children are born of intellectual parents, and for this reason alone it is well for the pregnant woman to occupy her mind with pleasant and artistic thoughts. The belief that great mental excitement, such as the witnessing of gruesome or ugly sights, will be reproduced in the offspring, dates back to the beginning of history. Previously to the discovery of the circulation it was firmly believed that the life impulses flowed through the body of the fetus as through any other organ of the maternal body. We now know that there is no vascular (circulatory) or nervous connection between mother and child. We also know from the study of the development of the child that the fetus has all the physical attributes of an adult by the end of the sixth week, and this is

about the time that the average woman first discovers that she is pregnant.

It is during the later months of pregnancy, or after the fetus begins to enlarge, that the thought of marking the child begins to cause anxiety. Since there are no vascular or nervous connections between mother and child, and the child has all the adult organs and appendages after the sixth week, it is unreasonable to believe that emotional upset could cause a deformity, such as the loss of a foot or the addition of a toe. It is also worthy of note that similar monstrosities occur among the lower animals where the mentality is so low that emotional upsets could not possibly play a part.

There is no question but that certain maternal conditions which affect the health of the mother, such as poor nutrition, infectious diseases, and the like, may seriously impair the health of the fetus. It is a matter of fact that shock can so upset a nursing mother that convulsions will occur in the nursing child, but never a deformity in its physical structure. Sudden shocks have been known to set up a spasm in the muscular wall of the uterus, disturbing the placental circulation and causing abortion or death of the fetus, but never a physical deformity. It is just as reasonable to believe that a premature seven months' infant nursed by a black mammy (as was once the custom in the South) would develop the traits and appearance of a negro as it is to believe that a full-term child could be deformed in the last two months of a normal pregnancy.

Many of the puny, wailing, fretful infants which we often see are erroneously attributed to some "prenatal impression," when the true cause of their nervous condition is the result of improper nutrition during their early formation, or an inherited defective germ plasma which is completely beyond the control of either parent.

We have seen in a previous chapter that the child derives its oxygen and nutrition from the mother's blood. Anything that

tends to interfere with this circulation or change the constituents in the blood will interfere with the health of the child. It may even destroy it, but cannot disfigure it.

Many patients will ask, if it is true that there are no nervous, vascular, or any other anatomical connections between mother and child, then why is it that there are so many stories concerning the alleged deformity of the child following some shocking experience of the mother? It is simply a matter of coincidence if pure invention is to be excluded. It is hardly possible for a woman to go about for nine full months without some sort of mental upset, and yet nearly all women who expect to find some deformity in their child are agreeably surprised at birth to find everything perfectly normal. The structure of the human mind is such that it soon forgets incidents unless something occurs later to recall the incident to consciousness.

It seems, therefore, that deformities, monstrosities, birthmarks, epilepsy, and even insanity are either handed down from generation to generation (inherited), or result from some defect in the germ plasma or the displacement of some important cell in the early weeks of pregnancy. It has been said that wooden heads may be inherited, but wooden legs are the invention of man.

CHAPTER V

THE EFFECT OF PREGNANCY ON THE MOTHER

Signs and Symptoms of Pregnancy

In a previous chapter the development of the unborn child has been briefly traced from its beginning in the fertilized ovum, through its various phases of embryonal and fetal development, to its emergence into the outer world. In this chapter an attempt will be made to describe some of the effects of pregnancy upon the prospective mother and in a later chapter the effects of the mother upon the child.

It is no exaggeration to say that pregnancy has a definite effect upon every organ and tissue in the mother's body during pregnancy, and for some time after birth. These changes are mostly of a physiological or biochemical nature, but a great many are the result of pressure on, and mechanical displacement of, abdominal organs by the growing child. These changes in the maternal organism give rise to certain manifestations which are commonly known as the "signs and symptoms" of pregnancy. It is these same signs and symptoms which enable the physician to recognize the pregnant state and note its progress.

SIGNS AND SYMPTOMS OF PREGNANCY.—The early signs and symptoms of pregnancy are so universally known that most women make the diagnosis without much difficulty at a very early date. Unfortunately other conditions, particularly the "change of life" or irregularities of menstruation during lactation, give rise to similar symptoms and confuse the diagnosis. It is not uncommon for women who are anxious to bear children, or through fear of an illegitimate pregnancy, to skip a menstrual period and imagine themselves pregnant. On the other hand it is not rare to find women who go four or five months without suspecting pregnancy. In other words, the well-known early signs

at best are only probable signs; a positive diagnosis cannot be made until pregnancy is well advanced. Even the opinion of the trained obstetrician is only a presumptive diagnosis until one of the positive signs of pregnancy is elicited. Therefore, in the early weeks of pregnancy no patient should feel perturbed if her physician requests her to return at the end of a month for further examination.

The signs and symptoms of pregnancy have been divided arbitrarily into three groups: *possible, probable,* and *positive,* according to their relative importance and the time of their appearance. The certainty of diagnosis is attained only when one of the positive signs is determined, but the accumulation of presumptive and probable evidence will make the diagnosis almost positive. The difficulties of diagnosis, as you will note, are lessened as pregnancy advances and new signs are added.

PRESUMPTIVE AND POSSIBLE SIGNS.—In the order of their importance they are: (1) Cessation of menstruation; (2) morning sickness; (3) changes in the breasts; (4) disturbances in urination; (5) miscellaneous signs and symptoms.

1. Cessation of Menstruation. — Normal menstruation occurs about every twenty-eight days throughout the reproductive life of women. The regularity, the duration, and the amount of the flow vary greatly in different women. The average girl begins menstruation at about the age of fourteen and ends about the forty-fifth year. As a rule women who begin at an early age are prone to finish earlier, but not always. The regularity of the flow is governed by the ovary and depends upon the process of ovulation, described in a previous chapter.

The delay of a monthly period in a healthy woman of childbearing age, who has previously been regular, is very strong evidence of pregnancy and is usually the first symptom noticed. The missing of two successive periods doubles the evidence and makes

pregnancy very probable. Sometimes ill health, the change from one locality to another, strong emotion, or fear of an illegitimate pregnancy, will cause the skipping of a period. On the other hand irregular menstruation may persist up to the fourth or fifth month of a normal pregnancy.

It is worthy of note that menstruation may be very irregular following childbirth and lactation. It is not uncommon for nursing mothers to begin menstruation soon after labor, skip one or two periods, and believe themselves pregnant. As a rule a modern, young mother is greatly alarmed and considerably embarrassed by the early prospect of a new arrival. The diagnosis of such an unwelcome pregnancy following closely upon the heels of a previous pregnancy is most difficult, principally because of this irregularity of menstruation during lactation and because of the fact that the female organs have not resumed their normal size and position. It is more frequent for such women to consider themselves pregnant than to overlook the condition.

2. **Nausea and Vomiting of Pregnancy** (Morning Sickness).—Shortly after the missed period, or about the sixth week of pregnancy, nearly 80 per cent of pregnant women suffer more or less from nausea in the morning on assuming the upright position. Hence the name "morning sickness." Occasionally nausea will begin as early as the third week or as late as the tenth week. In a great number of patients the condition persists throughout the day, and is frequently relieved by vomiting or by lying down. In a few women nausea occurs toward evening when the patient feels weary. As a rule nausea lasts about two months, but in severe cases it may begin early and continue throughout pregnancy. It is usually worse in first pregnancies.

Nausea is but a presumptive sign, because it frequently occurs when no pregnancy exists.

3. **Changes in the Breasts.**—About the time of the skipped period the breasts begin to enlarge and become more firm. the

veins over them become engorged, and a certain feeling of warmth and tingling is felt. Very soon the nipple becomes enlarged and is sore to the touch. A dark tinge appears over the pink area of the breast, and the little papillae, where the mouths of small glands open on the surface, become more prominent (Figure 13).

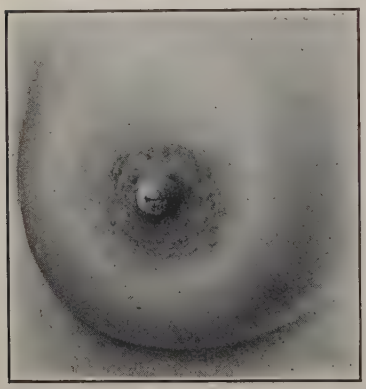


FIGURE 13. *Breast of pregnant woman, showing characteristic changes.*

If a yellowish, watery discharge can be expressed from the nipple of a woman who has never borne children, it is a very probable sign of pregnancy. In women who are nursing children this sign is of no value. The same is true in women who normally suffer from engorgement of the breasts during menstruation. Because of these exceptions breast changes alone are of little value, particularly after the first pregnancy, unless they are accompanied by other signs.

4. **Disturbances of Urination.** — Shortly after the missed period and about the time morning sickness appears, the pregnant woman frequently complains of a sense of pressure in the region of the bladder, and passes her urine more often than usual. This condition is sometimes very annoying, causing the patient to get up at night, thus interfering with sleep. Frequency of urination is more than likely due to the same cause as morning sickness, namely, pelvic congestion. It is certainly not due to any change in the composition of the urine or disturbance of the kidneys and usually passes off in three or four months. The frequency of urination so common in the later months of pregnancy is due to the pressure of the growing uterus upon the

bladder. This same tendency to empty the bladder frequently is often the result of nervousness.

The four symptoms enumerated above are not always constant, but any one occurring in a married woman of childbearing age is suggestive of pregnancy and should cause her to consult her physician. In other words, if a woman has skipped one or two periods, if the breasts are enlarged, and if she has nausea which is associated with frequent urination, she may feel almost certain that she is pregnant.

5. **Miscellaneous Signs and Symptoms.**—The above symptoms by no means exhaust the number of symptoms occurring during early pregnancy. It must always be remembered that pregnancy is not limited to the reproductive organs, but is a physiological process affecting the whole organism. In addition to the changes in the reproductive organs and breasts, there is a stimulation of the ductless glands, which has a pronounced effect upon the nervous system. The secretions of these glands also regulate the process of metabolism, that is, the building up and breaking down of the tissues of the body. Because of their increased activity very often a patient becomes nervous or restless or has a tendency toward dizziness or faintness. For the same reason a pregnant woman will have intense cravings for certain foods, and become overweight. In rare cases the saliva becomes profuse and runs out of the mouth in streams.

In addition to the changes mentioned above, the woman may have a marked change in disposition and temperament. The skin becomes muddy in appearance, particularly upon the cheeks and neck. The umbilicus becomes more shallow and has a dingy, dirty appearance. A dark brown line usually extends from the umbilicus downward to the pubic hairs.

THE PROBABLE SIGNS OF PREGNANCY

1. **ENLARGEMENT OF THE ABDOMEN.**—The enlargement of the abdomen is the result of the changes that are taking place in the reproductive organs. The growing child requires nourishment and needs more room for growth. For this reason the blood supply to the generative organs is increased and the uterus enlarges from a small pear-like structure weighing about two ounces to an organ more than a foot in length and weighing about two pounds. At the beginning of the third month the top of the uterus can be felt through the abdominal wall (Figure 14). At the beginning of the fourth month the uterus is about the size of a grapefruit and can be felt as a mass in the lower abdomen. About this time the abdomen begins to show enlargement and, from this time forward, there is a gradual, symmetrical increase in size until the birth of the child. Abdominal or pelvic tumors, ovarian cysts, or fluid in the abdominal cavity (dropsy) very often cause enlargement of the abdomen, but the increase is neither regular nor symmetrical. The abdomen becomes more protuberant and more pendulous after each succeeding pregnancy by reason of relaxation and the loss of tone in the abdominal muscles. For this reason it is not uncommon for women in the latter half of a second pregnancy to suspect twins.

FIGURE 14. *Diagram illustrating the size of the uterus at the end of various weeks of pregnancy.*

II. **CHANGES IN THE UTERUS.**—Other changes that take place in the organs of reproduction can be detected from the beginning to the end of pregnancy. The very early changes are ascertained only by pelvic examinations. The later changes are so obvious that they need no explanation. At the beginning of the second month the body of the uterus has doubled in size and has changed from a firm pearlike organ to a globular mass of doughy or elastic consistency. The cervix, up to this time, remains firm, but the mouth becomes soft and more patulous. The upper vagina and cervix soon show the effect of the increased blood supply, and take on a characteristic bluish tint.

III. **INTERMITTENT CONTRACTION OF THE UTERUS.**—Throughout adult life the uterus undergoes painless, rhythmic contractions from ten to fifteen minutes apart. When pregnancy takes place these contractions become stronger and can be detected fairly early by pelvic examination. It is only during the course of a pelvic examination that the examiner can detect the changes in size, shape, and consistency of the uterus. In the later months of pregnancy the woman herself can feel the uterus grow hard and quickly relax by placing her hand upon the abdomen when in the reclining position.

IV. **FEELING OF LIFE** (Quickening).—About the end of four and a half months the expectant mother feels a sort of flutter or quiver in the lower abdomen, very similar to that of gas in the intestines. This sensation, spoken of as "quickening" or "life," occurs when the movement of the fetus within its fluid sac becomes strong enough to be perceived by the mother. As growth continues these movements become more and more marked and later may become so violent that they disturb the comfort of the mother and can be seen through the clothing. The perception of movement was once thought to indicate the beginning of life, or the time when life entered the body of the fetus, hence

the term "life." Occasionally fetal movements may be perceived as early as three and a half months, or may be delayed as late as the fifth or sixth month. Life is nearly always perceived earlier in subsequent pregnancies than the first, because once it is definitely felt it is more easily recognized a second time and is less likely to be mistaken for other conditions.

Quickening is the earliest trustworthy manifestation of pregnancy and can be detected by the examining physician almost as early as the mother perceives it. It is not uncommon for an active child to remain quiet or cease moving for a time. Ordinarily this should not cause any anxiety, but if the patient feels apprehensive it is best that she report to her physician for examination. This sign will be discussed more fully under positive signs.

POSITIVE SIGNS OF PREGNANCY

Usually after the fourth month there is no mistake about pregnancy, but occasionally doubt continues until the time of birth. However, if any one of the following positive signs are obtained, the state of pregnancy is established beyond question.

I. **HEARING AND COUNTING THE FETAL HEART.**—It is not always such a simple matter as one would think to hear the fetal heart. There are many other sounds from which the fetal heart tones must be distinguished. Often the child's heart is so far away from the listener that it cannot be heard. A thick abdominal wall or an excessive amount of amniotic fluid will greatly obstruct the sound. The maternal blood rushing to the placenta, the pulsation of the abdominal aorta, or the passage of gas in the mother's intestines will occasionally obscure or so closely resemble the beating heart that it cannot be positively identified.

Since the fetal heart rate near the end of pregnancy is about twice as fast as the maternal heart rate, it is necessary to count

as well as hear its rhythmic pulsations in order to be certain. If one hears a muffled ticking sound with a rate of about 120 to 160 per minute, when the maternal heartbeat has a slower count, then one can be positive that the woman is pregnant.

After the sixth month the fetal heart rate should be detected without difficulty in the average patient. Before this time the ability to hear it depends for the most part upon the thickness of the abdominal wall and the position of the child. The rate at first is very fast, but becomes slower as the child enlarges, so that at "term" it is approximately 130 to 140 a minute. The point at which the fetal heart can best be heard helps the physician materially in determining the position of the child before birth. It should be understood that the mother cannot feel these pulsations. It may be of interest to know that the pulsations of the fetal heart may be heard as early as the fourteenth week with a vaginal stethoscope.

II. **FEELING THE BABY'S PARTS.** — After the fifth month it is possible to feel the outline of the fetus, if there is a thin abdominal wall and the abdomen is relaxed (Figure 15). This sign is not of much value unless one can be certain of feeling the head, back, and extremities. Irregular uterine tumors are very similar and occasionally cannot be differentiated from fetal parts.

III. **SEEING AND FEELING THE BABY MOVE.**—In the early months the movements of the fetus are extremely delicate, but as development goes on and the child matures, they increase in strength until they may become painful to the mother and attract the attention of others. During the latter half of pregnancy the movements may be felt at intervals by gently resting the palm of the hand on the enlarging uterus. Irregular contractions of the uterine wall or intestinal gas may confuse the inexperienced.

A very helpful sign is frequently obtained by the physician as

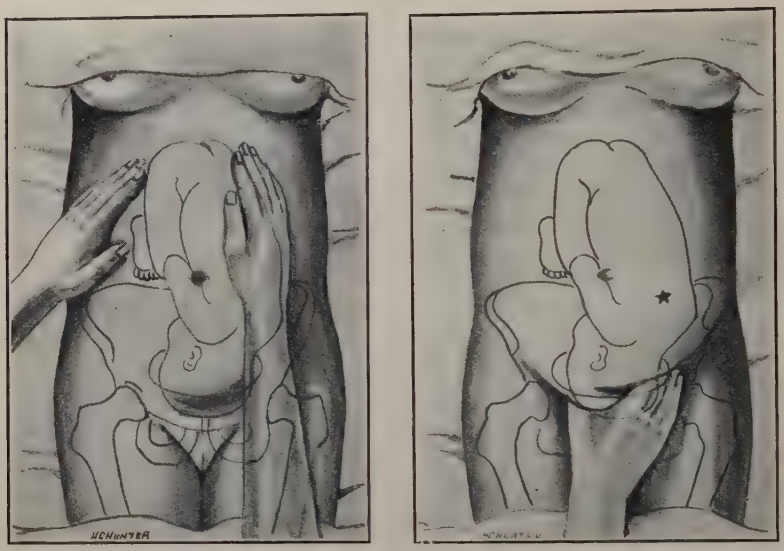


FIGURE 15. *Diagram illustrating palpation of the fetus near the end of pregnancy.* ★ *Point where the fetal heart is heard through the abdominal wall.*

early as the fourth month. This sign is obtained by placing the index finger through the vagina in contact with the uterus. By carefully tapping the uterine wall the fetus is bounced away through the bag of waters and falls back again against the tapping finger. This sign (ballottement) is valuable when obtained, and depends for its detection upon the presence of a mass in a bag of fluid.

IV. **X-RAY AND CLINICAL LABORATORY TESTS.**— In thin persons the shadow of the fetus may be seen as early as the third or fourth month of pregnancy, but requires special apparatus at this time. It is sometimes difficult to obtain a definite shadow even during the last month if the patient is obese. A clear fetal shadow at any time is positive evidence of pregnancy (Figure 16).

Of late years there have been developed certain laboratory tests which are aids to a diagnosis of pregnancy. There is only one of any considerable importance at the present time. This test depends upon the lowering of the *sugar tolerance* in pregnant women.

Figure 16. *X-ray picture of eight months' fetus in normal position.*

It has been known for some time that pregnant women will excrete in the urine an excessive amount of ingested sugar more readily than nonpregnant individuals. Upon this basis a laboratory test has been designed which will detect early pregnancy in 80 to 90 per cent of the doubtful cases. Other tests on the blood have little or no value.

CHAPTER VI

DURATION OF PREGNANCY AND DATE OF CONFINEMENT

The object of intrauterine life is to nurture the embryo until it becomes sufficiently developed to exist independently of the mother. It takes nature about nine calendar months to accomplish this purpose. Since most babies develop at about the same rate, it seems as if there should be little difficulty in determining the duration of pregnancy and the exact date of confinement. Unfortunately this is not true for two reasons. In the first place we do not know the moment when life actually begins, and in the second place we do not know what induces labor.

Throughout animal and plant life we see this same variation. Cattle bred on the same day vary as much as a month or more in the birth of their calves. Seeds planted on the same day sprout on different days and therefore ripen on different days. The same is true of the human race. If we knew the exact date of conception or fertilization of the ovum we could determine with fair accuracy the date of confinement for the normal, full-term child. But since we do not know the exact time that this occurs, we cannot exactly forecast the day when the baby will be born. For this reason it is important for the woman to appreciate certain facts that she should remember.

Pregnancy usually terminates for the average woman at the end of ten lunar months or ten menstrual periods of 28-day intervals, that is, 280 days. It may be of interest to know that miscarriages, as well as normal labor, usually occur about the time of a missed period. A simple rule, although far from being accurate, for estimating the date of confinement is to count forward 280 days from the first day of the last normal menstruation; or, what amounts to the same thing, look forward nine calendar months and add seven days. The date arrived at is only approxi-

mate and should never be relied upon as the exact date, for only 5 per cent of all patients are confined on this date and about 50 per cent within a week of this date. To illustrate, if the last normal menstrual period began July 1, then delivery should occur about April 8. First pregnancies are frequently an exception to the rule and terminate a week or ten days earlier than subsequent pregnancies. If for any reason the patient should know the exact date of fruitful intercourse, she should bear this in mind and tell her physician. It has been shown that the average duration of pregnancy from this date is approximately 273 days, or nine calendar months.

If pregnant women would record these facts it would help to eliminate a great deal of mental distress during the later months of pregnancy and help them to arrange better for their confinements.

Often the menstrual history is uncertain or a nursing mother may become pregnant before menstruation has been reëstablished. In such cases we hope to estimate the date of confinement from the time that the mother first perceived fetal movements (life). This perception of life varies greatly in different women and in different pregnancies. It is usually about the eighteenth week in the first pregnancy and a week or two earlier in subsequent pregnancies. It is very helpful in determining the beginning of pregnancy in cases where an irregular menstruation has followed the last normal menstruation.

Since 80 per cent of women suffer from morning sickness, and about 50 per cent begin near the sixth week of pregnancy, it is sometimes an aid to know when this begins. If a woman begins with morning sickness two weeks after the last menstrual period, it is very likely that her pregnancy began near the previous menstruation and should be dated from that time.

In addition to these signs, which depend upon the observation of the woman herself, other means of estimating the date of confinement may be determined by the physician. One of these

means depends upon the size of the uterus at the various stages of development (Figure 14). At the third month (twelfth week) the uterus is felt to be about the size of an orange; during the fourth month it rises into the abdominal cavity, which begins to show enlargement; at the sixth month (twenty-fourth week) the top of the uterus is at the level of the umbilicus, and at the eighth month it reaches the ribs. After the ninth month (thirty-sixth week) the uterus grows or protrudes forward, and during the last two weeks the head of the baby settles into the brim of the pelvis.

Another ingenious means of determining the age of the unborn child is sometimes ascertained by measuring in inches the distance from the top of the uterus down to the top of the pubic bone and regarding the result as equivalent to the age of the child. Thus, if the distance from the top of the uterus to the top of the pubic bone is six inches, then the duration of the pregnancy is approximately six months. Too much reliance cannot be placed upon this measurement, since twin pregnancies or pathological conditions going on within the uterus itself may cause its size to be much out of proportion to the corresponding month of a normal pregnancy.

The most accurate and scientific means of determining when labor ought to begin is by careful routine examinations during the later weeks, to determine the state of development of the child itself. The aim should be to prevent delivery of the child before maturity and yet not allow pregnancy to continue after the child reaches maturity.

PREMATURE AND PROLONGED PREGNANCIES.— It would seem, from the foregoing paragraphs, that if we knew exactly when life or the development of the fetus began we could foretell the exact day of delivery. Unfortunately this is not true because of other factors which enter into the problem. Some women habitually go into labor much earlier than others. It

seems that the placenta becomes loosened in its attachment, very similar to the ripening of fruit on a tree, so that a slight jar is sufficient to initiate labor. For this reason a hard day's work, a rough automobile ride, or a large dose of castor oil, near term, will frequently start contractions.

If labor begins before the baby has properly matured, it is spoken of as a *premature labor.* These labors are sometimes longer and more painful than normal births. The greatest care has to be exercised in saving these babies. If they weigh less than four pounds they may die at birth because of hemorrhage into the brain or lack of development of the respiratory centers. If they survive the initial shock they often die from too much handling and exposure, or succumb later from starvation because their digestive apparatus has not been sufficiently developed to digest and absorb food. On the other hand, occasionally babies that weigh less than three pounds survive and develop into healthy individuals if given proper care.

It frequently happens that some women have a few pains at the expected "term," but do not go into active labor. The fetus goes on developing and increasing in size until it becomes much larger than the average full-term baby. These pregnancies are spoken of as *prolonged pregnancies,* and the children are said to be post-mature. Such children have large, hard, unyielding heads which do not mold properly, causing difficult labors. The greatest care must be taken in the supervision of these cases lest the baby become so large that operative procedures, which would endanger the life of both mother and child, are necessary. Careful and frequent examinations about the time of the predicted date should be made to determine whether these pregnancies should be terminated artificially or be allowed to proceed naturally. It is simply a matter of determining the relative size of the child's head to the size of the pelvis. In 80 per cent of these cases an ounce of castor oil will start active labor.

From the foregoing it would seem that pregnancy is a rather

complicated and hazardous undertaking. The average patient during the early months may suffer from nausea and lose a few pounds in weight, but during the later months the appetite and general health may become greatly improved. It is not uncommon to see a frail anemic girl, subject to painful periods and with a delicate constitution, become pregnant and develop into a robust woman, the very picture of health.

CHAPTER VII

NECESSARY EXAMINATIONS IN PREGNANCY

During the past twenty-five years the greatest strides in the practice of medicine have been in the institution of preventive measures to control disease. By eliminating the cause of yellow fever the Panama Canal was completed after two previous unsuccessful attempts. Typhoid, malaria, and smallpox, three of the most dreadful scourges of the past, have been all but eliminated by preventive measures. These are only a few of the examples of what has been accomplished, for the whole field of surgery has been improved and broadened by the prevention of infection. At the present time there is no field where preventive measures have wider application and can do more good than in the field of obstetrics. We have learned that surgical cleanliness reduces the incidents of childbed fever, and routine urine and blood pressure examinations will practically eliminate convulsions of pregnancy. It is also true that careful physical examination and clinical histories will reveal deformities and diseased conditions which might result fatally to mother and child if pregnancy were allowed to proceed naturally to term.

It is gratifying to know that pregnant women are beginning to realize the importance of repeated examinations during pregnancy, as shown by their tendency to accept prenatal care. They have learned that the disasters of pregnancy are much more frequent in those cases which have had inadequate or no prenatal care. It is this medical supervision during the course of pregnancy which gives the physician the means of preventing complications and the knowledge of just what to expect at the time of labor. It is the coöperation between physician and patient which will reduce the mortality and morbidity of childbearing.

THE FIRST VISIT.—The pregnant woman should consult her physician as soon as she has reason to believe that she may be

pregnant. If possible a careful, medical, and obstetrical history and a thorough physical examination should be obtained at the first visit. If it is not done at this time it should not be neglected at a subsequent visit. This history forms an important part of the antepartum record and should include a careful inquiry into the home surroundings and general health of the patient. It should contain a record of previous diseases, particularly those which affect the heart, lungs, kidneys, and digestion—such as rheumatism, tuberculosis, scarlet fever, constipation, and so forth. The character and date of the last menstruation, the onset of morning sickness, the beginning of urinary frequency, and the appearance of breast changes, should be jotted down in order to estimate better the date of confinement. Failure to estimate accurately the date of confinement will cause the patient considerable worry and the doctor no little embarrassment if the baby does not arrive near the predicted date. It is also important that the patient should understand that the date arrived at is only an estimated date and that only 5 per cent of babies arrive on this day.

Next, a history of previous pregnancies is important. This should include a careful history of the health during such pregnancies, the character of labor, the mode of delivery, the rapidity of convalescence, and the ability of the patient to nurse the baby.

At the same time or at a subsequent interview the patient should be given a thorough physical examination. All patients should have this done even if they appear perfectly healthy. This should include an examination of the heart, lungs, kidneys, and other organs and an examination of the blood, if necessary. The patient should be carefully gone over for foci of infection, with special attention to the teeth. With modern methods of anesthesia teeth can be extracted or treated with far less disturbance to the patient than would result from leaving an active foci to undermine her health.

A physical examination should be made to determine if there

exists any deformity or physical underdevelopment likely to cause difficult labor. Only rarely do we find pelvic deformities that present a real problem. But when we do find one it may be equal to saving a life and possibly two. By a few simple measurements the physician is enabled to determine accurately the size and character of the pelvis, and to compare it with the average normal pelvis. If the pelvis is small or a bony obstruction exists which would obstruct the passage of the fetus, it will give him an opportunity to deliberate and to outline the future treatment. At the same time the breasts and nipples should be examined for defects in their structure and development.

At this time the patient should obtain from her physician a list of instructions which she should follow. She should be instructed to report every two weeks for blood pressure and urine examination and for such physical examinations as her physician may deem necessary. She should be instructed in the hygiene and the care of the body, and impressed with the importance of notifying her physician if any of the following symptoms be observed: scanty urine, persistent headache, disturbance of the vision, swelling of the feet, puffiness of the face, loss of blood, persistent constipation, or if she feels that anything is not as it should be. It is a good plan to record the weight of the patient at each visit. Pregnant women are prone to put on weight, particularly in the latter half of pregnancy. There is a normal physiological gain of approximately fifteen pounds, but beyond this, restriction in diet is quite imperative.

A *second physical examination* should always be made about one month before the estimated date of confinement, at a time when the fetus has developed to such a size that it completely fills the cavity of the uterus and assumes its final position for birth. Labor may be easy or difficult, according to the position and presentation of the child. Over 95 per cent of children are born head foremost, which is the easiest and most natural position for delivery. By a series of simple external maneuvers the

outline of the fetus can be made out through the abdominal wall (Figure 16). The outline of the head, back, and small parts should be felt. This gives the physician the position of the child, and an idea of the character of labor to expect. The fetal heart sounds are the best evidence that we have of the health of the fetus, and since these are almost always heard through the back of the fetus, their location gives the physician additional evidence as to the position of the child.

The greatest value gained by this examination is that it enables the physician to determine the relationship of the fetus to the bony canal through which it will eventually pass. A large child may successfully pass through a large pelvis and a small child through a small pelvis, but if a large child is forced through a small pelvis it may be injured or labor may be prolonged and difficult. The pelvic measurements should again be checked over and an effort made to fit the child's head into the brim of the pelvis. If the fetal head is felt to be large and does not descend into the pelvis by gentle pressure from above, an external examination should be made and the cause of the obstruction determined. If an abnormality exists, it should be corrected immediately, or if the child has developed to such an extent that further increase in its size will make its birth extremely difficult and hazardous, labor should be initiated at once. In this manner, that which would be a very difficult and dangerous delivery may be turned into a nonoperative, reasonably natural confinement without injury to either mother or child. If any doubt exists as to the maturity of the child, the patient should return within a week for a secondary examination.

From one to two weeks before term, in approximately 90 per cent of first pregnancies, the child's head descends naturally into the mother's pelvis. This settling of the baby's head into the brim of the pelvis lessens the abdominal distention and is commonly spoken of as *"lightening"* (Figure 17). This is always a sign that no disproportion between child and pelvis exists. It

also facilitates dilation of the cervix, so that in 50 per cent of all cases dilation will be well under way before labor pains are felt.

The value of regular examinations throughout pregnancy cannot be overestimated. The difference between success and failure is more or less dependent upon these visits to the physician. For the sake of emphasis and clarification, the following summary is appended:

FIGURE 17. *Diagram illustrating the position of a full-term fetus in a woman with a pendulous abdomen. The head of the child has settled into the true pelvis (lightening).*

1. The patient must report to her physician every two weeks, or oftener if the occasion demands.

2. An examination of the urine and a record of the blood pressure should be made every two weeks (preferably on alternate weeks; the urine one week and the blood pressure the following week.)

3. A complete examination is made during the early months to determine the physical fitness of the patient to bear children. At this time the physician will be able to formulate in a general way what the future course of pregnancy will be, and to create in the patient a spirit of confidence.

4. Examinations are necessary during the middle months to determine the development of the fetus and to ascertain the health of the mother. At the same time the physiology of pregnancy can

be explained to the patient, and the miscellaneous and incidental discomforts attended to.

5. An examination in late pregnancy is made to ascertain the position of the child and the relation of the presenting part (usually the head) to the mother's pelvis. The character, course, and date of delivery are determined as best they can be at this time.

CHAPTER VIII

HYGIENE OF PREGNANCY

THERE ARE MANY THEORIES regarding the nature of pregnancy. There are those who regard the pregnant state as injurious to the health of the mother, a sort of "prejudicial parasitism" in which the mother makes a sacrifice for the child. It is often summed up in the expression "for every child a tooth." I believe that the actual birth of the child does injure every mother to a certain extent, but I cannot make myself believe that the period of gestation is always detrimental. On the contrary, I believe that in the majority of cases it is beneficial, if the patient takes the proper care of herself. Convincing evidence of this is seen in delicate women who gain in weight and assume the appearance of health during gestation.

The majority of medical men, however, regard pregnancy as a normal function that tests the efficiency of every part of the mother's body, a condition of health rather than of disease. Ballantyne refers to it as "physiology working under high pressure" and compares it to strenuous physical exercise, which we all regard as beneficial, if kept within certain limits. Looking at pregnancy from this angle, it is imperative that the prospective mother should make a strenuous effort to "put her house in order" and observe and maintain the laws of personal hygiene.

FOOD AND DIET

COMPOSITION AND USES OF FOOD.—From the beginning to the end of life the tissues of our bodies are constantly changing; the worn-out cells are being continually replaced by new ones. A certain amount of energy is necessary to promote and perfect this process. From this it can readily be seen that food is required for at least two purposes: that is, to furnish new material for tissue building and repair, and to supply heat and

energy to maintain this process. Our tissues are built up from the food substances that we eat, and the waste materials thrown off are principally the residue of broken-down cells and undigested food particles. Anything that interferes with the natural exchange of the elements necessary for cell function will necessarily interfere with the health of the individual. It is also essential that an abundant supply of oxygen, in the form of fresh air, be supplied for the proper combustion and conversion of all food substances for the body's use.

A chemical analysis of our bodies shows that they are composed of water, minerals, proteins, fats, and carbohydrates. In addition to these food elements it has been shown clinically that certain other substances, called vitamines, are necessary to preserve the tissues in a healthy state. Experiments have shown that pregnant animals given a diet deficient in certain vitamines produce small underdeveloped offspring which never seem to recover from their early physical defects. The lack of certain vitamines and some minerals, particularly phosphorus, calcium, and iodine, in the mother's diet is thought to be the cause of many defects in the child, such as slow dentition, soft bones, nerve irritability, and improper physical development.

We have seen in a previous chapter how the unborn child derives its food and warmth from the maternal blood stream. It is from the mother's diet that the blood obtains its nutriment. The mother's diet, therefore, is of the greatest importance because it is the sustenance of life of both mother and babe, and their health depends for the most part upon good food and proper digestion. This must not be understood to mean that indiscretions in diet are the sole cause of indigestion, because many other factors influence this process. The condition of the mind, worry, exercise, sleep and rest, all play a part.

To the average American mother, good common sense and a healthy appetite are usually all that are necessary in choosing a well-balanced diet. If she will keep before her mind a wholesome

outlook and not worry too much about what goes into the stomach, a large part of indigestion will be eliminated. Much of the enjoyment of one's meals will be lost if too close attention is paid to the choice of food. A safe rule is to eat the usual amount of food, restricting meats to once a day. The diet of the pregnant woman need not materially differ from her previous diet, if it contains all the essential food elements. One can be very sure that the diet is adequate if the weight is correct for the age and height.

Nature has been very kind to the pregnant woman. Animal experimentation has proved that the pregnant animal does not require more food than the nonpregnant animal. It seems that nature has increased the "housekeeping" efficiency of the pregnant individual so that the repair tissue, together with the amount of heat and energy required, is not materially increased. In addition to this it has been shown that the pregnant woman has greater power in extracting or deriving nourishment from the ordinary diet than at other times. It is not uncommon for a woman during the early months of pregnancy to report that she has no appetite, vomits the little that she does eat, and yet retains her weight. If one stops to think that the average babe weighs seven and a quarter pounds at birth, and that it has nine months in which to gain this weight, it is not likely that the pregnant woman need "eat for two." The fact is that the digestive function of the pregnant woman has so improved that enough for one is sufficient for two. The quality and not the quantity of food is the important factor.

It has been said that pregnancy is health under high pressure which tests the functional soundness of all the organs in the body, particularly those of digestion and excretion. If any organ is weak or the woman is constitutionally delicate, the strain of pregnancy is likely to aggravate matters and may end in disaster. If a diseased condition of the kidneys is present it is very likely to show up at this time, since a great amount of additional work

is placed upon the maternal excretory organs of the mother. It is therefore important for her to choose a diet that will not overtax the functions of the kidneys, bowels, and skin. An ideal diet should therefore contain an abundance of fresh fruits and vegetables, a small proportion of meat, fish, and eggs, and a very liberal supply of liquids, particularly milk and buttermilk, if well tolerated. Fresh fruits and leafy vegetables (celery, spinach, lettuce) have a laxative effect upon the bowels and also contain vitamines and minerals necessary to the growth and health of both mother and babe. The eating of cheese in small amounts should be encouraged because cheese contains lime and phosphorus for bone building.

It may be of interest to know that nine-tenths of the weight of the body consists of water. *Water* is not food in any sense, but it is absolutely essential for the maintenance of life. Fluids dilute the poisonous substances in the blood, and flush out the waste products. They increase the efficiency of tissue building and repair and safeguard the excretory organs. The accumulation of waste material in the maternal blood is the cause of many minor and a few serious complications of pregnancy. For this reason the pregnant woman should make it a rule never to drink less than eight glasses of water daily. She should excrete at least one quart of urine in twenty-four hours. If the urine is dark in color or burns in passing, it is evidence that she is not drinking a sufficient amount of water.

Milk, which contains both water and food substances, should be an important constituent of the diet. It contains all the necessary food elements in an ideal form for digestion. If the pregnant woman will establish the habit of drinking milk during pregnancy, she will be more likely to furnish more and better milk for her baby. *Tea* and *coffee* are not food substances, but stimulants. Not more than one cup of either should be taken at one time, and if possible this should be restricted to once a day.

Alcohol should never be taken except for some special purpose, and then only under the direction of the doctor in charge.

A few words are necessary on the *amount of food required* by the pregnant woman. As stated above it is not necessary to "eat for two," but to eat enough simple wholesome foods to satisfy a moderate appetite. The quantity should be sufficient to maintain the weight at a definite level. The kind of food, the right amount, and the manner in which it is digested are the important factors.

During the later months of pregnancy, when the general health is better, the appetite increases and may become, at times, ravenous. There is a marked tendency, at this time, for the prospective mother to gain in weight. In one way this is not a bad tendency, because frequently the health of a thin, delicate woman is permanently improved. There is a natural tendency for the bust to broaden and the hips to become more rounded, but the accumulation of excessive fat is not a good thing and should never be tolerated. Indulgent women often learn to their sorrow that the reduction of weight requires more will power than they had anticipated. Overeating is the principal cause of obesity and indigestion. The pregnant woman frequently gains from ten to thirty pounds in weight during the course of her pregnancy, and stout women are likely to increase in weight more rapidly than thin. A patient whose weight is above the standard and who continues to increase over the natural reproductive increase will more than likely manifest toxemic symptoms, such as edema, high blood pressure, and albuminuria.

Fat women as a rule have more difficult labors, do not stand the stress of labor so well, and resist infection poorly. Fat persons, at all times, are poor risks, and insurance companies will not accept them at the usual rates. For these reasons the pregnant woman should carefully guard against becoming overweight. As a matter of fact nearly everyone past middle life would suffer less discomfort and have better digestion if they practiced a certain amount of self-restraint. The Minnesota Board of Health

in their pamphlet on the promotion of Maternal Welfare summarize the danger of obesity as follows: Overweight—The ideal weight after thirty-five years is slightly below the average weight. This was learned through evidence collected by forty-three American life insurance companies. After the thirty-fifth year there is a definitely increased death rate in fat persons over lean, and this rate increases directly as the overweight increases. "The tendency to gain weight as one grows older is pathological and should be combated." Overeating is an excess and is largely a habit. Elderly women are prone to this habit, although they will scarcely ever admit that they eat too much. They are like the drunkard of other days who "only had a drop now and then to settle his stomach." Puffing and blowing, they draw nearer to their untimely deaths, illustrating the truth of the saying, "The platter kills more than the sword."

During the early months of pregnancy, when the tendency to morning sickness is most evident, it is not necessary to guard against overeating. The character of the diet will do much to moderate those symptoms. Many patients find that carbohydrates (starchy foods) are well borne, and if eaten frequently in small quantities, the distress from morning sickness, heartburn, faintness, and palpitation of the heart is lessened.

Much has been written and printed in popular novels and magazines about the peculiar and disgusting *cravings* of pregnant women. These cases are more or less the product of the writer's imagination and not based upon actual facts. In the extreme cases on record it has been found that this condition is the result of some mental derangement erroneously attributed to pregnancy. It is true that the pregnant woman, like anyone else, does have preferences and desires for particular articles of food, and more than likely her desires are more intense. If the article she craves is not particularly harmful there is no reason why the desire should not be satisfied. In most cases the cravings may be prevented by satisfying the appetite with normal food. There is

no truth in the old belief that these cravings must be satisfied for the child's sake.

Self-restraint in the later months of pregnancy will contribute largely to the wellbeing of both mother and child. Large meals are never advisable. The stomach is smaller than usual and is crowded upward by the growing uterus. Experience has shown that small amounts of food eaten between meals have a tendency to modify a ravenous appetite. It is also well to remember that a full meal at bedtime is the cause of many a sleepless night. To sum up, one should eat only enough to satisfy hunger, or, what amounts to the same thing, refrain from overeating, which may easily become a habit.

THE RELATION OF THE SIZE OF THE CHILD TO THE MOTHER'S DIET.—The size of the child depends for the most part upon the period of intrauterine incubation; that is, the longer it remains within the uterus the larger it becomes. For this reason premature infants are smaller and post-mature children are larger than normal, full-term babies.

A large amount of experimental work has been done in regard to the relationship of the size of the child to the mother's diet. It has been definitely proved that pregnant animals that are fed excessive amounts of rich food as a rule produce larger offspring than animals that have been restricted in their diets. Observation upon pregnant women tends to corroborate this. As a rule indulged women, or women of the better classes, who take little exercise have slightly larger babies than women who have insufficient food and are forced to work longer hours. In other words, if the amount of food ingested is more than the body requires it is stored as fat in mother and babe alike. What the pregnant woman should strive for is a well-developed baby, and not a fat child that will prolong labor or make it difficult.

It has been shown in a previous chapter that the baby derives its nourishment from the mother's blood and indirectly from the

mother's diet. It has been observed that when the amount of food in the diet becomes less than the requirements of both mother and baby, or when any food constituent is lacking in the diet, nature has provided that the baby shall supply its needs from the mother's tissues. In other words, the principal needs of the unborn child are supplied from the mother without any regard to the maternal needs. If the mother fails to ingest sufficient lime or phosphorus, the child takes his supply from her tissues, and impairs her health to that extent. This is the reason why it is not uncommon to see a thin, undernourished woman give birth to a plump, healthy baby.

Many attempts have been made to reduce the weight of the child and to lessen the difficulty of labor by dieting. It has been shown that a diet, free from sugars and starches and in which the amount of fluid has been restricted, has a tendency to lessen the weight and to soften the bones of the child. It is never wise to attempt such measures except under the careful direction of a competent physician, otherwise it will jeopardize the health of both mother and babe, and may bring on premature labor. In conclusion, one is safe in saying that if the mother will keep her own health up to standard, she need never worry about the health of the unborn child.

FOODS AND THEIR USES (SUPPLEMENTARY)

In a previous chapter it has been shown that the body requires food for three purposes: to produce energy, to build and repair tissue, and to regulate and correlate the functions of the body. A well-balanced diet must meet all these requirements. It should contain all these different food constituents: carbohydrates, fats, proteins, water, minerals, and vitamines.

CARBOHYDRATES—Starches and sugar furnish the body with heat and energy. They are easily digested and should form the principal part of the diet. When eaten in excess of the needs of the body, they are stored as fat.

FATS are burned to produce energy or stored within the tissues as reserve energy. They are hard to digest and not tolerated in large quantities; carbohydrates are preferable. Obese individuals would do well to eliminate fatty foods.

PROTEINS (meat, fish, eggs) are a necessity of life and are utilized in the repair of the tissues of the body. They are also used to produce heat and energy when the amount of carbohydrates and fats is small, but in their utilization as food they exert additional strain upon the organs of digestion and excretion. An excess of protein may cause intestinal irritation and impair the function of the kidneys.

WATER AND MINERALS assist in building new tissue and in repairing and supplying the wants of old tissue. Fluid dilutes the waste products within the blood and assists in their elimination. Although calcium and phosphorus form a part of all tissue, they are the principal constituents of bone. Iron forms the essential part of the red blood cells and increases the combining power of oxygen for the combustion of food substances. Lack of iodine causes thyroid disease and in a pregnant woman is said to cause cretinism in the unborn child.

VITAMINES are protective substances necessary for the development and maintenance of health and vigor. They increase the quality of body tissue and increase resistance to disease. The physical development and constitution of the child very largely depend upon these elements. The lack of vitamines is said to be the cause of slow dentition and bad teeth, rickets, scurvy, and many constitutional diseases.

CHOICE OF FOODS

The choice of foods depends, for the most part, upon the appetite of the individual. The appetite depends upon a number of factors: the state of the mind, the preparation of the food, and the manner in which it is served. The palate is a capricious organ. What may be appetizing today may be distasteful tomorrow. A healthy appetite and agreeable surroundings stimulate digestion. On the other hand, worry and strong mental excitement may inhibit the digestive secretions and completely arrest the digestive process. No two digestive systems are exactly alike. One individual may be able to digest one food well, while another individual may be seriously upset by the same food. Like all others, the pregnant woman in choosing her food should aim to satisfy her appetite, except for those things that she has reason to believe will not agree with her.

ADVISABLE FOODS

FRUITS.—Raw fruits furnish fluids, quench thirst, lessen the desire for sweets, and have a laxative effect. Fresh fruits in season, such as apples, peaches, apricots, pears, plums, cherries, oranges, figs, pineapples, grapes, grapefruit, strawberries, raspberries, and blackberries are desirable, if tolerated well. Stewed fruits, such as dried fruits, are allowable. It is a good rule to partake of some kind of raw fruit daily.

CEREALS.—Cream of wheat, wheat, cracked wheat, bran, oatmeal, cornflakes, shredded wheat, puffed rice, and boiled rice are readily digested and important for their nourishing and laxative qualities.

MILK.—Milk, buttermilk, cream, and butter. Milk in some form should form a part of every diet.

EGGS.—Soft-boiled or hard-boiled and grated, so as not to contain any large particles; poached, scrambled, or omelets. Eggs are a very good substitute for meat.

SOUPS.—Cream or milk soups, vegetable or meat broths. Soups supply fluid and nourishment and stimulate a sluggish appetite. Highly seasoned soups should be avoided.

FISH.—Fresh fish, boiled, broiled, or baked; oysters and clams in season. Lobster and crab should be eaten sparingly, if at all.

MEATS.—Chicken, lamb, mutton, veal, ham, bacon. Meats should not be eaten oftener than once a day and omitted on days when fish and eggs are served. These are protein in a concentrated form and difficult to digest. Pork, duck, and goose should be eaten sparingly and avoided entirely by women who digest fat poorly. Fat is hard to digest and likely to cause nausea.

BREAD.—White, graham, whole-wheat, rye, bran, toast, zwieback, or crackers. Stale bread and toast are more readily assimilated than fresh bread. Hot bread and hot cakes should be avoided.

VEGETABLES.—String beans, spinach, carrots, beets, boiled onions, cooked celery, squash, tomatoes, sweet potatoes, lettuce, water cress, uncooked cabbage, and green salads. All vegetables should be eaten fresh when possible. They are more essential to the pregnant woman than they are to the average woman. They furnish vitamines, minerals, and fluids. The residue or undigested particles stimulate intestinal peristalsis and act as a laxative. Cooked cabbage, cauliflower, eggplant, cucumbers, green onions, radishes, and boiled beans frequently cause flatulence and thus are the cause of much discomfort.

DESSERTS.—Custards, tapioca, junket, rice or bread puddings, fruit puddings, jellies, gelatin, ice cream, blancmange, fresh fruits, stewed fruits, and jams. Desserts, as a rule, are easily digested foods in attractive form.

BEVERAGES.—Coffee and tea may be taken once daily if one is in the habit of taking them. Weak tea and coffee are not so stimulating as the public have been taught, but excessive tea and coffee drinking should be avoided. Milk, milk soups, fermented milks, malted milks, and cocoa are preferable. Beverages containing traces of alcohol have no deleterious effects.

FOODS TO BE AVOIDED

Rich puddings and pastries, highly seasoned foods, spiced foods, rich sauces and oily salads, hot bread or biscuits, fried foods of any kind, particularly pork. Cucumbers, raw onions, beans, cabbage, radishes, and so forth, if they cause discomfort.

SAMPLE DIETARY IN PREGNANCY

The following is suggested by the Chicago Lying-in Hospital:

During the first three months, at the period when the appetite is fickle and there is a tendency to nausea or vomiting, food taken every three or four hours but in small amounts and containing a preponderance of sugars and starches will be most easily borne. The following few suggestions may be helpful in planning the meals for this time:

Before Arising—

Two crackers, or slice of toast.
Glass of milk, or weak hot coffee with cream and sugar.

Breakfast—

Orange, apple, dish of stewed prunes or apricots.
One egg, or one small chop, or two slices of crisp bacon.
Two slices of toast with butter, or one shredded-wheat biscuit with cream and sugar.
Cup of cocoa, or postum, or glass of fresh milk.

At Ten o'Clock—

Three oatmeal crackers, or Nabisco wafers.
Glass of milk.

Lunch—

One cup of cream of asparagus or celery.
Two salt soup crackers.
Lettuce, tomato, endive, or chicory salad with sugar and a dash of lemon or sweet vinegar—no spices.
Two thin slices whole-wheat bread, or toasted rye bread.
One pat of fresh butter—preferably unsalted.
Two tablespoons of ice cream, or custard, or floating island.

Tea—

One cup of chocolate, or tea with lemon and sugar.
One piece of simple cake—3 x 2 x 1 inches—or crackers.

Dinner—

One cup of bouillon, or vegetable soup. Two salt soup wafers.
Two tablespoonfuls mashed potato, or carrots.
A small lamb chop, or equivalent of steak, or veal, well done.
Two thin slices old bread, or toast, or soda crackers.
One pat of butter.
Fresh salad, tomato, or lettuce, or endive, without spicy dressing.
Sweet dessert, lemon ice, blancmange, or ice cream, one-half cup.

At night—

Glass of hot or cold malted milk.
Two or three oatmeal crackers.

During the second three months the stomach is more settled and larger meals with less frequency may be advisable.

Breakfast—

One orange, one-half grapefruit, or stewed prunes.
Oatmeal or other cereal and cream, or rice with honey.
One egg with two slices of crisp bacon.
Two slices of toast, or corn muffin or roll.
One pat fresh unsalted butter.
Cup of cocoa, weak coffee, or postum, with sugar and cream.

At Ten o'Clock—

A glass of milk.

Lunch—

Cream of celery or tomato soup.
Two salt sticks.
One scrambled egg with strawberry preserve.

Lettuce, tomato, or endive salad, sugar and lemon dressing.
Two slices old bread, or toast, or crackers.
One pat of butter.
Dessert—blancmange, ice cream, or custard, one-half cupful.

Tea—

One glass of chocolate malted milk, or tea with lemon and sugar.
One American or cream cheese sandwich.

Dinner—

Plate of vegetable soup (little spice), or cream of corn, or celery.
Two salt wafers.
One ½-inch lamb chop, or equivalent of fish, or steak, well done.
Mashed or baked potato, or carrots, or spinach, one-half cupful.
Salad—lettuce, tomato, cabbage, or endive, with sugar, lemon, and oil.
Dessert—jelly roll, ice cream, or fruit ice, one-half cupful.
Plain cheese with hard cracker.

At Night—

Glass of hot malted milk.
Two oatmeal crackers.

During the last three months of pregnancy the demands of the fetus for food, for lime, phosphorus, and iron are greatest, and the mother's diet should supply them, else the child will draw on her reserves. For example, Dr. Widows has shown that, from the seventh month on, the fetus utilizes about ten grains of calcium (lime) every day. There is usually enough calcium in a general diet, but it may be guaranteed by the women eating lime-bearing foods, oatmeal, milk, cheese, yolk of egg, etc. Sunlight has been found to promote the calcium and phosphorus metabolism. Codliver oil (rich in vitamin A) acts like sunlight, and in certain cases of undernourishment may be added to the diet.

Breakfast—

One orange or apple or one-half grapefruit, or stewed prunes.
One saucer oatmeal, or other cereal with cream, or rice and honey.
One soft-boiled egg with two slices crisp bacon.
Two slices toast, or one corn or graham muffin, with butter and syrup.
One cup cocoa, or milk, or weak coffee.

Ten o'Clock—

Fresh fruit, or fruit juice drink.

Lunch—

Cream of asparagus, or of celery, or vegetable soup (no spice).
Plain wafers (unsalted).
One small chop, or one egg, in any fashion.
Salad made with yolk of egg dressing, or sugar, lemon, and oil.
Two thin slices buttered bread, or toast, or oatmeal crackers.
Weak tea, or cocoa, or glass of milk.

Tea—

Hot malted milk, or milk. Cheese sandwich.

Dinner—

Plate of soup (unspiced and with little salt).
Plain wafers.
Baked potato, crushed carrots, or spinach, or beet tops.
Fish, or meat, 3 x 2 x ½ inches; plain sauce.
Salad—lettuce, cabbage, etc.; no spiced dressing.
Dessert—ice cream, plain layer cake, custard, or fruit sherbet.
Cheese and Bent's hard crackers.
Nuts (unsalted, well masticated).

CHAPTER IX

HYGIENE OF PREGNANCY—(Continued)

EXCRETION AND ELIMINATIONS.—In a great many respects the action and function of the human body are similar to those of a machine. Apparently the human body is the most efficient piece of mechanism ever designed. It is governed by the same laws and forces that govern the steam engine, and at the same time is far more efficient, if kept in good condition. Like the locomotive, it needs constant care and attention.

In the previous chapter the value of proper food has been forcibly brought to the attention. The proper utilization and elimination of this food are of still greater importance because good health depends for the most part upon good digestion and proper excretion. As with the engine, if the ashes are allowed to accumulate and the flues become clogged, the fire burns with difficulty and the efficiency of the machine soon decreases. Age is nothing more or less than a gradual decline in the functions of the body; the digestion becomes sluggish and excretion more difficult.

Experience has shown that excretory matter contains poisonous substances, which if allowed to accumulate, impair the functions of the organs and permanently interfere with health. In the pregnant woman it is still more important to keep the maternal excretory organs in perfect condition, because the poisonous products from the child are eliminated through the mother. Pernicious vomiting and other toxemias of pregnancy, such as eclampsia (convulsions), are manifestations of accumulated poisonous materials in the blood that the body has failed to eliminate.

CARE OF THE BOWELS.—There is a marked tendency throughout life to become more constipated with age. Nine out of

every ten persons past middle life suffer with constipation. This is brought about by a number of conditions, some of which the patient can only ameliorate and others that lie wholly within her control.

In primitive man the diet consisted mostly of fruit, vegetables, coarse grains, and raw meat, obtained by the muscular efforts of the individual. The desire for defecation was heeded before the impulse wore off, and constipation did not exist. Civilization has completely changed the physiology of the human race. We eat and drink differently, exercise less, and pay less heed to the impulses of nature. The preparation of our food has changed its constituents. It has become more concentrated, and certain vitamines have been destroyed in cooking. Most of the coarse bulky foods, and those containing purgative substances, which stimulate intestinal activity, have been partially eliminated. In other words, constipation is for the most part a disease of civilization.

Pregnancy tends to accentuate this diseased condition. The internal secretions have been altered, impairing digestion. The growing uterus increases abdominal pressure and pelvic congestion. In the later months of pregnancy the uterus presses directly against the intestines, interfering with intestinal peristalsis. Besides increasing the tendency to constipation, the products to be eliminated have been increased by the baby whose waste material is emptied into the maternal blood stream. Although the fetal waste products are small in amount, they are, nevertheless, dangerous if not excreted at once. They are apparently difficult to eliminate, and if they are allowed to accumulate they injure the function of the kidneys and endanger the life of both mother and child. It is therefore important that the pregnant woman should have at least one evacuation of the bowels daily. The best method of overcoming constipation is to follow some definite system.

I. **Establish a "Habit Time."** — The natural impulse for evacuation of the bowel is initiated by the presence of fecal ma-

terial in the lower bowel or rectum. Constipation is the end result of not satisfying this desire. If the desire is not satisfied the impulse soon passes off. The next morning the impulse is less strong and very soon nature will allow the rectum to fill without initiating the desire for evacuation. The best and surest way to avoid or overcome constipation is never to resist the impelling desire to empty the bowel.

Habit and mental suggestion play a very significant part in the treatment of constipation. When constipation is present the bowel has to be reëducated to move at a definite time, and in this manner reëstablish the most fundamental and important asset in overcoming the condition. The best way to accomplish this is to set apart a regular hour, preferably after breakfast. If the desire to move the bowel is absent, wait for the impulse to come. The first morning or so it may be initiated by inserting a glycerine suppository or by taking a weak soapsuds enema. In a short while a normal movement will occur without any effort. In other words, evacuation should come about naturally in the pregnant woman, and abdominal massage never resorted to.

II. **Eat Coarse and Laxative Foods.**—The diet should be planned so that there will be bulk to the intestinal contents and nature will have an opportunity to eliminate the waste material by normal peristaltic action of the bowel. The chief aim is to secure a soft, solid, easily passed fecal mass. This can be accomplished by eating vegetables and fruits that contain laxative substances, or foods that form a bulky mass of finely divided soft material. Fruits of this type are: figs, prunes, dates, grapefruit, oranges, apples, peaches, apricots, and pineapples. Vegetables, especially the green variety, such as peas, beans, spinach, celery, and lettuce, and cooked vegetables, such as carrots, asparagus, cabbage, cauliflower, turnips, and onions, if well tolerated, are advisable. Coarse bread, bran, cereals made of whole grain, or a proprietary substance similar to agar, have a laxative effect.

A good fruit laxative that has withstood the test of time can be made as follows: Take a pound of dry figs and a pound of dry prunes, wash well, then remove the stones from the prunes and, if very dry, soak for an hour. Put both fruits through a meat chopper and add two ounces of finely powdered senna leaves. Stir into this mixture two tablespoonfuls of molasses to bind it together, making a thick paste. Begin by eating, at bedtime, an amount about the size of an egg and increase or decrease as may be necessary. Keep the paste in a tight jar in a cool place.

Another helpful aid to overcome constipation is to take a glass of warm water on rising in the morning and again upon going to bed. Water taken freely at all times has a laxative effect and should be encouraged. The weight of medical opinion favors the abandonment of enemas, purgatives, and laxatives, except in special emergency.

III. **Enemas and Drugs as a Last Resort.** — If the above suggestions fail to relieve constipation, then artificial methods should be resorted to. It is better to form the habit of taking enemas, suppositories, or harmless drugs and be happy, than to die with a well-trained bowel that has been a constant source of worry and has required a lifetime to educate.

An injection of four ounces of olive oil or liquid petrolatum can be left in the bowel over night and is harmless. It will soften the mass, soothe the bowel lining, and help relieve rectal spasm. Glycerine suppositories may be obtained at the drugstore at a very low cost; they are helpful to initiate rectal peristalsis. A small plain or soapsuds enema may be taken, but will only relieve the lower bowel, and may irritate the mucosa and destroy the muscular tonicity of the rectum. A very useful intestinal lubricant is mineral oil in one to two tablespoonful doses, which is not absorbed and does not gripe. Petrolagar (alkaline), which is a mixture of mineral oil, agar, and magnesium oxide, is better than the plain oil. It mixes intimately with the fecal contents, lubri-

cates and softens the mass. Purgatives should never be resorted to, and laxatives, when necessary, such as mild salines and cascara, should be alternated from week to week to avoid increasing the dosage. Castor oil should never be taken; it wearies the musculature of the bowel and in the end increases constipation.

IV. **Change in Mode of Life.** — Constipation occurs most often in individuals who are not engaged in active manual labor. They become "soft and flabby," and all of the muscles of the body, including the muscles of the intestine, become weak and are easily fatigued. Daily exercise, good food and fresh air should be encouraged. In the early months of pregnancy, walking, golfing, bathing, or calisthenics increase the tonicity of the muscles.

Obstinate constipation should be treated only under the care of a physician.

KIDNEYS (Urinary Excretion).—If one has read the foregoing chapters with attention, one cannot fail to be impressed with the important part that the kidneys play in pregnancy. The kidney is probably the pregnant woman's most vulnerable spot. It is the weakest link in the chain and the cause of many serious complications. Because of the frequency of kidney failure and the serious complications that follow, it is of the utmost importance to examine the urine at regular intervals throughout pregnancy. This should be done by a physician or laboratory expert, both chemically and microscopically.

The pregnant woman is often misled by unscrupulous newspaper and patent medicine advertisements into believing that frequent urination, pain in the back, or white sediments in the urine are signs of kidney disease. This is not true, because frequent urination in pregnancy is due to bladder congestion and to the pressure of the uterus in restricting the capacity of the bladder; the pain in the back is from muscle fatigue, the muscles having no nervous connection with the kidneys; and the sediments are normal constituents of the urine which precipitate

after cooling. They are, occasionally, a sign of concentrated urine due to insufficient water intake.

The kidney is purely an excretory organ and through it most of the waste material and impurities from the mother and babe are excreted. If these poisonous products are not properly eliminated, the mother will very likely develop eclampsia, which is popularly known as "convulsions" of pregnancy. Diabetes and Bright's disease are other diseases which can readily be detected by chemical examination of the urine.

The pregnant woman can do much to prevent serious complications and it is well worth her time and trouble to follow out a few simple instructions. She should drink at least three quarts of fluid daily so that the regular 24-hour specimen of urine never falls below three pints. The urine should be measured once a month during the first three months, and twice a month during the remainder of her pregnancy. The 24-hour specimen should be obtained as follows: Procure a two-quart glass jar or pail; clean and scald it and put into it a teaspoonful of boric acid crystals; empty the bladder as usual (not in the bottle) at 8 a. m.; save all urine passed during that day and night. At 8 o'clock the next morning empty the bladder and add that urine to the collection. Measure the amount; shake up the mixture and fill a four-ounce bottle for examination. Label the bottle and write plainly the name, address, date, and total amount collected in the twenty-four hours, and send to the physician. Often a single fresh sample of morning urine will be sufficient, but the total quantity should be ascertained just the same. If you find that you are passing less than three pints daily, or that the urine is highly colored, you will know that you are not drinking enough water. The physician will examine the urine for color, acidity, specific gravity, albumin, and sugar, and look for blood, pus, or casts which are signs of kidney irritation. In this way he can tell if the kidneys are functioning properly and detect the onset of serious complications.

If any of the following symptoms should occur suddenly, such as scanty urine, persistent headache, disturbance of vision, puffiness of the face, or swelling of the feet, the patient should inform the physician at once and report for examination.

The blood pressure is a very important check upon kidney function. In the early months it seldom goes above 130 m.m., but in the later months it may increase to 140 or 150 m.m. A steadily increasing blood pressure is one of the early evidences of an impending toxemia, and will usually be observed before albumin is present in the urine. Blood pressure readings should be taken every two weeks throughout pregnancy, and daily readings and urine examinations whenever signs of toxemia appear.

CARE OF THE SKIN.—Bathing.—The skin serves three important functions; it protects the structures beneath from injury, it regulates the temperature of the body by increasing or decreasing surface radiation, and serves as an excretory organ to eliminate the impurities of the bodies of both mother and babe. On close examination it will be seen that the skin contains many minute sweat and oil glands whose mouths or pores empty their contents on its surface and help to keep it oily and soft. This excretory function is always active, winter and summer, and in pregnancy it is more active than usual. In a normal individual a pint or more of water containing waste materials is poured out on the surface of the body every day, and this may be increased to three or four pints by hot drinks, exercise, water drinking, and warm weather, or in case of disease, by hot packs and fomentations. Bathing keeps the skin in a healthy condition. It opens the pores and stimulates the circulation, and indirectly increases the elimination of waste materials.

A daily lukewarm bath, or sponge with soap and water, followed by a brisk rubbing with a Turkish towel, will keep the skin in a healthy condition, increase the general muscular tone, and relieve the kidneys of much of the work of elimination. The tem-

perature of the water is best at 80 or 90 degrees Fahrenheit. Hot or sitz baths are inadvisable and may induce miscarriage. They are also depressing. Cold baths, unless one is accustomed to them, are inadvisable because the shock or the danger of chilling may stop the glandular activity and interfere with the excretory function of the skin. Sea or lake bathing, in quiet water, is not harmful, unless unusual exertion is required to maintain the balance. Swimming and diving should never be indulged in.

It is preferable during the last six weeks of pregnancy to take shower or sponge baths. The entrance of water into the vagina may introduce infection, and, if labor should begin shortly after, a fever might result.

CARE OF THE GENITALS.—Douching.—The walls of the vagina are normally kept moist and soft by small glands in the cervix which secrete mucus. Early in pregnancy there is an increase in the circulation to the pelvic organs which stimulates these small glands into greater activity. When the secretions become profuse, the condition is called leucorrhea and calls for medical attention. If the discharge is allowed to dry upon the genitals, the skin may become irritated and become the seat of intense itching.

Frequent cleansing and drying of the parts are essential to avoid this annoying condition. Often it is necessary to employ some medical preparation containing soda, lead acetate, or a weak solution of carbolic acid to allay the itching. A careful examination of the urine should always be made to make sure that diabetes or an impending toxemia is not responsible.

A great many women feel that the vagina is not clean and should be cleansed by *douching*. Occasionally this may be necessary, but should never be done except under direction of a physician. The secretions in the vagina are acid, and bacteria do not live in the upper part of the vagina normally. For this reason,

and because vaginal irrigations may introduce infection or induce labor, douching is unnecessary and hazardous.

If the discharge becomes so profuse that the parts become red and swollen, or if an infection, which might injure the patient's health and the eyes of the baby, is present, the physician should be notified. For this reason any unusual vaginal discharge should be investigated, and a microscopical examination of the discharge, obtained from the cervix, should be made.

A vaginal infection requires specific treatment by the physician, and should never be attempted by the patient.

CLOTHING.—Clothes were originally intended and designed to protect the skin and keep the body warm. Today clothes are designed for adornment, and give to the wearer personal pride or mental comfort, as well as physical protection. There is no reason why the clothes of the pregnant woman should not be artistic and attractive, so long as they perform the duties for which they were originally designed. Happily, the styles of women's clothes of the present day answer the purposes of maternity very well. The long straight lines of the loose-fitting garments, which hang from the shoulders and do not constrict, make pregnancy more comfortable and less conspicuous. If the pregnant woman can mix with her friends without attracting too much attention, her mind will be more cheerfully occupied and her physical discomforts will be lessened.

Most of the up-to-date department stores carry neat, attractive, and comfortable dresses designed for this purpose. They also carry a variety of patterns for those who wish to make their own clothes.

The maternity dress should be warm and hang from the shoulders, so as not to interfere with the action of the heart and the expansion of the lungs. There should be no constrictions about the abdomen which might interfere with the child's development. The weight of the material, of course, should vary

with the climate and season. In cold weather the underclothes should cover the whole body and be of such texture as to absorb moisture, prevent chilling, and keep the sweat glands active.

In the preceding chapter the function of the skin as an excretory organ has been described. It may be of interest to note that convulsions of pregnancy, which are the result of improper elimination of waste products, are more common during the cold months. It is, therefore, just as important to preserve the function of sweating by warm clothing as it is to increase elimination by drinking large quantities of water. It is not necessary to wear woolen underwear, unless one is accustomed to it. Loose meshed or porous cotton union suits are hygienic, cheap, and easily laundered.

CORSETS. — The old-fashioned corset and tight lacing have been discontinued, let us hope forever. Young women, particularly those pregnant for the first time, who are not accustomed to wearing a corset, will do well to continue without a corset except during the last few weeks of pregnancy. Women with weak abdominal walls and pendulous abdomens are more comfortable during the last half of pregnancy if the abdomen is supported by some sort of binder or maternity waist (Figure 18).

FIGURE 18. *Abdominal support.*

The abdominal supporter should fit snugly about the hips and support the enlarged abdomen, rather than confine the abdominal contents and force them downward into the pelvis. If one is accustomed to wearing a comfortable corset that fits well, there is no necessity of making any change until near the end of pregnancy.

The attempt to conceal pregnancy by tight lacing may interfere with the nutrition of the child and induce miscarriage, or premature labor. It will not deform the child, as many women believe.

GARTERS or circular constrictions about the legs should never be worn, as they interfere with the circulation and tend to cause varicose veins and swelling of the feet and ankles.

SHOES.—Shoes that are painful to the feet or destroy the equilibrium of the patient should be discarded. High heels tend to throw the body forward and increase backache and leg strain. Shoes with low, flat heels and broad toes, designed for comfort and support of the arches, are preferable. In buying shoes it is advisable to buy a size larger than usual because of the increased weight and tendency toward swelling of the feet during the later months.

EXERCISE.—The active employment of body and mind is a prerequisite to the health and happiness of any individual. It is indispensable to the pregnant woman, and is better than medicine. It promotes digestion and the assimilation of food, increases the circulation and respiration, opens the sweat glands, and stimulates the organs of excretion. Proper exercise strengthens the muscles, quiets the nerves, diverts the mind, and is conducive to restful sleep.

Without question, the best form of exercise for the pregnant woman is walking in the open air and sunlight. It has been shown that the body absorbs some biochemical substance, closely related to the vitamines, from the sunlight, which promotes health and

increases resistance against disease. If for no other reason than this, every pregnant woman should get out in the open at least two or three hours every day. The distance that she walks, or the amount of physical exercise that she takes, depends upon her individual capacity. The best method is to walk leisurely and avoid becoming fatigued. It is well to begin by walking a short distance at first and gradually increase the distance each day, until a mile or more is covered without fatigue. Walks of moderate length are a decided benefit, but too long a walk is more harmful than no exercise at all. If after a short rest the patient feels refreshed, she has not walked too far.

A short walk in the cool of the evening, with agreeable company, will often rest the patient, both mentally and physically. New scenes divert the mind, create new interests, and increase cheerfulness. A good suggestion is to plan each walk so that it will be interesting. The mother who dutifully performs an allotted task loses half the benefit of her outing. Some women are nature lovers, others will be more cheered and interested by studying the shop windows, or by watching the life on a busy street.

No healthy woman need neglect her household duties on account of pregnancy. A certain amount of ordinary light housework with the windows open, if the weather permits, is an excellent form of indoor exercise. If a woman is accustomed to doing her own housework without fatigue, to continue is beneficial, but work that is uninteresting and tiresome should be avoided if possible. Light housework, which creates interest and is agreeable to perform, prevents the patient from becoming introspective and neurotic. Hard work, such as large washings, scrubbing, house cleaning, lifting of heavy furniture, overreaching and stretching, is hazardous. A sensible housewife will plan her task so that she does a little each day rather than to work too hard one day and spend the next day in recuperating.

All forms of strenuous exercise should be avoided; horseback riding, swimming, tennis, golf, and dancing should not be in-

dulged in ordinarily. This is particularly true about the time of the missed menstrual period when the uterus is most irritable and any sudden exertion is likely to start uterine contractions, bringing on miscarriage. Pregnancy is no time to develop muscle. It is a time to build up the strength rather than to tear it down.

Young women, who for economical reasons are holding clerical positions, may continue this work up to the fourth or fifth month of pregnancy, provided the work is agreeable and does not overtire them. If the work is fatiguing it is best to work only half a day or discontinue it altogether. No pregnant woman should continue such work after the sixth month. Women who work too hard or too long, as a rule, have weak, sickly babies. A good many states forbid, by law, the employment of pregnant women.

There are some women who are not able to indulge in outdoor exercise because of heart or kidney disease. For such women a certain amount of indoor exercise in bed, in conjunction with massage of the extremities and body, is not only advisable, but essential. Deep breathing and active movement of the extremities, especially of the legs, stimulate the circulation and increase bodily strength.

Automobile riding cannot be classified as exercise, and is not a substitute for walking. It furnishes a certain amount of diversion in the fresh air and sunlight, and, if not too long, is generally beneficial. The harm from automobile rides comes as a result of jolting and speeding over rough roads and from the nervous tension because of fear of accident. Pregnant women are naturally more nervous than usual, and if they are obliged to sit in one position for any length of time they may become extremely irritable and nervous. A patient should never go riding unless the driver knows that she is pregnant.

TRAVELING.—Nowadays traveling is not fraught with the same dangers as in the days of the horse-drawn carriage. The railroad and paved highways make transportation an entirely

different proposition. Newspapers have a tendency to exaggerate the hazards of traveling, in the public mind. They point out all the uncomfortable and embarrassing situations that arise, but neglect to mention the thousands of pregnant women who travel back and forth daily without any mishap. Long journeys should not be attempted in the early weeks of pregnancy, especially by women who have previously miscarried; nor is it advisable in the later months, when crowding or jolting may induce premature labor. After the sixth month the uterus becomes increasingly sensitive and the patient is more apt to miscarry. For this reason long, tedious journeys should be taken in installments to avoid weariness and nervous tension. Before attempting such a journey, pregnant women should seek the advice of their physicians, since each case is an individual problem.

FRESH AIR.—Everyone knows that fresh air is invigorating and that stale air is stifling. To the expectant mother, impure air is injurious and indirectly endangers the life of the child. Her body requires an abundance of oxygen, both day and night, to assist metabolism. It is advisable for such a woman to spend a portion of each day in the open air.

Sunlight alone has a stimulating and healthful effect upon the body. Sometimes because of "morning sickness," or because of household duties, the pregnant woman finds it inconvenient to get outdoors. Under such circumstances it is more essential than ever that she get plenty of pure air. By a little planning she can arrange to do many odd jobs on the porch or under the trees. In good weather the indoor work should be done with the windows up and the doors open. In bad weather, or in winter when the house is stuffy, a window should be lowered from the top for an inch or two. As long as one wraps up well and keeps the body warm and dry, there is no reason for not taking advantage of the open air. At night the sleeping-room windows should be left as wide open as possible to provide a constant exchange of air. A

sleeping porch is preferable if it is available and can be conveniently sheltered from winds and drafts to avoid the chilling of the skin.

CARE OF THE BREASTS.—The greatest factor in maintaining the health and vigor of the newborn babe is the kind of nourishment it receives during the early weeks of its life. Every year more mothers are beginning to realize the importance of breast feeding, and that upon their health, and the attention given to the breasts, depends the quantity and quality of the milk. Any measure which builds up the physical condition of the mother, or quiets her mind, will naturally improve the quality of the milk. The ability of the mother to nurse her baby depends to a large extent upon the development and care of the breasts before the child is born.

In the early months of pregnancy the breasts need very little attention. During the middle and late months they become heavy and require support, and if they are not properly protected from the cold they may become very painful. Near the end of pregnancy attention should be paid to the nipples, to prepare them for nursing.

Women are often born with improperly developed breasts, or through injury or infection the nipples are held flat or inverted. No matter how good the quality of the milk, if the child cannot nurse comfortably, it will, sooner or later, be placed upon the bottle.

There are several ways of bringing out the nipple. If the nipple can be grasped with the thumb and forefinger, it should be drawn out forcibly and held for a few minutes, two or three times daily, during the latter half of pregnancy. If the nipple cannot be grasped with the fingers, it may usually be sucked out by filling a pint bottle, which has a small mouth, with hot water, and quickly applying it to the inverted nipple after emptying. Upon cooling, the condensation of the vapor within the bottle will create a par-

tial vacuum and draw the nipple into the neck of the bottle. Care should be taken not to use too much force in the beginning of treatment. If the nipple cannot be drawn out sufficiently for the baby to grasp, a nipple shield may be used, or the breasts pumped and the baby fed the milk until it can be placed on modified cow's milk.

In order to insure for the child a good milk supply, it is necessary to prevent the nipple from becoming irritated and from the possibility of breast abscesses. During the last three months of pregnancy the nipples and the area about them (areola) should be kept soft and pliable, and toughened to prevent soreness, after the child begins to nurse. Failure to attend to this is frequently the cause of infected nipples and breast abscess and the reason for artificial feeding.

A simple and inexpensive method of toughening the nipples is to bathe them night and morning with a solution prepared as follows: Dissolve one teaspoonful of boric acid crystals in one-half glass of hot water; cool and add an equal amount of denatured alcohol. Keep the solution in a tight bottle and apply with cotton. In applying the solution, rub the nipple and surrounding area until pink, but do not rub hard enough to irritate. After cleansing the nipple in this manner, anoint it with sterile olive oil and cover it with a clean piece of cloth to protect it from infection and to prevent soiling the clothing.

Sometimes during the latter half of pregnancy, the breasts begin to secrete a clear straw-colored fluid, known as colostrum. If this is allowed to dry on the nipple it forms fine crusts or flakes which are irritating and annoying. As soon as these incrustations form they should be softened with castile soap and water and carefully removed. The nipple should then be dried and some bland ointment rubbed into the irritated area. If the nipples get sore and crack, or if the little glands about them become infected, something more astringent in the way of medication is necessary to prevent infection and breast abscesses.

REST AND SLEEP. — A common complaint during pregnancy, particularly in the early months, is the alertness of mind and body and the tendency to tire or weaken upon slight exertion. In such conditions, no matter what the cause may be, the body needs rest. It is to be remembered that it is during sleep that the cells recharge and the body strengthens itself. These symptoms are but further proof that pregnancy is a physiological process affecting the whole organism, particularly the ductless glands that control and regulate the functions of the body, both mentally and physically. Occasionally this mixture of energy and lack of strength causes the prospective mother to become very emotional and irritable. Undoubtedly this is the cause of much restlessness and sleeplessness.

It so happens that this restlessness is more common during the first weeks of pregnancy, at a time when the ovum is insecurely implanted. For this reason the pregnant woman should religiously guard against any violent or strenuous exertion, particularly at the time of the missed menstrual period, when the whole organism is more irritable than usual.

There is no reason why the housework may not be planned so as to avoid weariness, by setting apart certain hours for relaxation and rest. In the middle of the day, preferably after lunch, a rest of one or two hours, either on the sofa or in bed, should be obtained. Any patient can find time for this if she so desire. To secure the most benefit, the shoes and all constricting garments should be loosened or removed before lying down. A few deep breaths of fresh air and a desire for relaxation will relieve the nervous and muscular tension.

A short nap in the afternoon is beneficial, provided it does not turn the night into day. Remember that too long a sleep in the daytime will interfere with sound sleep at night. Some women are accustomed to sleeping soundly for eight or ten hours, while other women lie awake for hours before falling asleep, and then foolishly remain in bed until late in the morning, in a semi-

conscious state, dreaming and tossing with the hope of making up the lost sleep. One must learn to sleep well, for sleeping is a habit. Ninety per cent of the persons who suffer from insomnia can cure themselves by going to bed at a certain time and getting up in the morning at a definite time. If a patient does not sleep well she should go to bed every night at 11 o'clock, and get up each morning at 6 o'clock, and about the second or third night she will sleep soundly, for a few hours, at least. In a short time she will accustom herself to seven hours of regular sleep, free from dreams and restlessness. It is worthy of note that women who attend to their own housework and get up early in the morning sleep better and feel better than their wealthier sisters who remain in bed until late in the morning to make up for loss of sleep during the night. To be able to sleep soundly and feel refreshed after rising in the morning is probably the greatest blessing on earth. It is the key to health and happiness.

Many women, although previously good sleepers, find it difficult to sleep during pregnancy. The physical changes brought about by the enlarging uterus sometimes interfere with and interrupt their sleep, to a certain extent. The pressure on the bladder frequently forces the patient to get up once or twice during the night. Also in the later months most women are forced to lie upon one side or the other and of necessity must accustom themselves to this new position. At the same time the upward pressure of the uterus often interferes with the proper action of the diaphragm and makes breathing at night difficult. As a rule these physical discomforts do not interfere with sleep if the patient takes plenty of exercise and has previously been a good sleeper.

Far more important than all these discomforts is the state of mind of the individual. A turbulent, irritable, active state of mind, or the fear of an impending sleepless night, lies at the bottom of most cases of insomnia. It may be of interest to know that sleep comes about as a result of the withdrawal of blood from

the brain. It is for this reason that an active mind, which increases the circulation to the brain, causes wakefulness, while a tranquil, untroubled, indifferent state of mind, which relaxes the circulation, produces drowsiness and is conducive to slumber. Confidence in the ability to sleep is half the battle. As before said, if the patient does not sleep well during the night, she should not worry about it, but get up in the morning at a specified time. If she will follow this advice she will certainly sleep better the next night, and still better the following night. If she feels drowsy during the day, or falls asleep in church, let her try a cup of coffee and she will be rewarded by a better rest at night.

There are many other factors that play a part in securing rest and sleep. It is very advantageous to arrange every detail in the room to be as conducive to rest as possible. A good mattress, clean soft bedclothes, and a well-ventilated room are essential. It is advisable to sleep alone in a separate room, if possible, and to arrange with the family that disturbances should be avoided.

Good digestion and proper elimination are the friends of sleep. Certain simple remedies, such as a glass of hot milk just before bedtime, a warm bath, or a hot-water bottle at the feet, will divert the blood away from the brain. Occasionally bromides in 10 to 30-grain doses, or veronal in 5-grain doses, two hours before bedtime, are necessary.

A few pregnant women, on the contrary, find themselves, in the early months of pregnancy, more sleepy and drowsy than usual. If, after careful examination, it is found that there is nothing abnormal physically, it need cause no anxiety and assurance can be given that it will soon pass off. Sleepiness during the later months of pregnancy, however, should be regarded with suspicion, for it may be the beginning of a toxic condition. The urine should be examined and the blood pressure taken, at once.

IMPORTANCE OF CHEERFULNESS.—The mind of the pregnant woman is unusually alert and easily depressed. She is

more susceptible to annoying conditions, and is more apt to exaggerate small ailments and recognize discomforts which ordinarily would not affect her. She should try hard to ignore or forget as many of the little inconveniences of pregnancy as possible. It is important that she assume a confident attitude from the start and pay no attention to the lurid descriptions in novels, or the harrowing episodes narrated by her well-meaning friends. Such stories tend to destroy her confidence in the physician and stir up needless apprehension. Osler says that confidence and hope have prevented untold misery and cured more ailments than any other single factor in medicine. They are the most essential attributes to success and happiness.

Too often the pregnant woman, because of fear of attracting attention in public, becomes a recluse. To prevent this she should make an effort to keep up her outside interests, and to cultivate a cheerful and hopeful mental attitude. To divert her attention away from her pregnant condition will broaden her vision and make her a more interesting mother. A pleasant ride in the country will often divert her mind from the irritating influences about the home, and give her a more healthful and cheerful aspect.

The husband can do a great deal to make pregnancy a little easier for his wife, if he will only try. He should be gentle and courteous, and avoid family disputes or arguments. With a little effort he can create new interests and lessen her discomforts, by amusing her. He must always bear in mind that his wife is more sensitive and imaginative than usual, and that little annoyances upset her "nerves" and make her unusually irritable.

It is not amiss to point out to the pregnant patient that woman's status has changed considerable from that of her grandmother, who believed her sole duty in life was to bring forth and rear a family. The modern family is much smaller, and the children have more interests away from home. The mother of today should understand that it will only be a short time before her children

are grown, and if she does not study, read good books, and create new interests, she will feel herself a burden to her children and the world at large. She will be a liability rather than an asset.

The best advice one can give to a pregnant woman is to learn enough about the physiology of pregnancy to recognize the danger signals of disease and to assume a confident and cheerful outlook. Let her look forward to the coming of the baby with pleasure and make her feel that she is about to make the world richer by another being.

CARE OF THE MOUTH AND TEETH. — Most women know that during pregnancy the teeth become soft and brittle and that toothache and decay are much more frequent than at other times. Often the roots of devitalized teeth become infected and are the hidden seat of many of the ills of pregnancy. Good teeth and proper mastication of food are certainly important factors in good digestion and good health.

During pregnancy the teeth should be given closer and better attention than usual, because of the changes which take place in the mother's body. Ordinarily the secretions of the mouth are alkaline, but during pregnancy they are frequently made acid by regurgitation and vomiting of the acid juices of the stomach. Experience has shown that acid has a deleterious effect upon the teeth, and, if present for any length of time, softens the enamel and causes irritation and swelling of the gums. For this reason the mouth should be kept scrupulously clean and an alkaline mouth wash used frequently. The teeth should be brushed after each meal and upon going to bed. During the early months, when the acid condition is most prevalent, the chewing of gum or the sucking of potassium chlorate tablets will free the mouth of acid. Milk of magnesia, lime water, calcium lactate, or ordinary baking soda are also excellent mouth washes.

In a previous chapter it has been pointed out that the child, in its efforts to obtain calcium and phosphorus for its bony structure,

takes these minerals from the maternal blood stream. If there is not sufficient calcium and phosphorus in the mother's diet to meet the needs, these minerals are extracted from her tissues, particularly her teeth and bone. For this reason it is important that she should eat foods rich in these elements, such as eggs, milk, leafy vegetables, and cheese. The ingestion of inorganic lime or chalk is of doubtful value; many physicians contend that it is not absorbed in that state.

The teeth should be examined by a competent dentist as soon as the woman knows that she is pregnant. A complete X-ray examination and careful examination of the gums should be a part of early prenatal care. All difficult or painful dentistry, such as crowns or bridgework, which may be delayed until pregnancy is over, is best not done. All fillings and extractions should be done as early as possible. There seems to be a mistaken notion prevalent among women that extractions or filling of teeth will bring on miscarriage. It is true, however, that a long, painful operation near the time of the missed period might start contractions, but miscarriages are most often due to some other cause. Modern methods of extraction can be done without pain and with little shock to the patient. It is far better to extract an infected tooth during pregnancy than to risk waiting until after the birth of the child. The best plan is—consult your dentist early and follow his advice as to treatment.

CHANGES IN THE SKIN.—The discolorations of the skin have been spoken of in a previous chapter as one of the signs of pregnancy. Marked discolorations do not appear until pregnancy is well advanced and are more pronounced in brunettes than in blondes. Often the discoloration appears as blotches over the face and neck, causing the patient some embarrassment because they give the appearance of uncleanliness. In some localities they are erroneously spoken of as "liver spots." They are not the result of any impaired excretory function, but are the result of

the accumulation of iron pigments in the connective tissue of the skin. Like freckles, they appear more marked in the summer when the sun is brilliant. This discoloration persists only a short while after pregnancy is over; rarely is the skin left permanently darker. Bleaching creams and other cosmetics have little, if any, effect in covering up the discoloration.

During the later months of pregnancy, when the abdominal wall becomes stretched by the growing uterus, and the patient has a tendency to gain in weight, small reddish cracks appear in the skin over the dependent parts of the abdomen. A similar condition appears in the skin over the breasts and over the thighs in obese individuals. This condition is due to a break in the texture of the skin. Following pregnancy these spots are gradually replaced by bluish and later by white scars. The skin never seems to return to its former smoothness. Oiling the skin has little value in the prevention of this condition, but forceful stretching and pulling the skin before these scars appear does seem to reduce their size and number.

Occasionally the skin under the breasts becomes irritated by the perspiration and accumulation of secretions upon its surface. This irritation may be lessened by bathing the parts with warm water containing a teaspoonful of baking soda to a pint of water. The itching may be relieved by anointing the parts with a solution containing an ounce of glycerine and a half teaspoonful of carbolic acid to a pint of water.

FALLING OF THE HAIR.—A few patients complain that the hair loses its luster and falls, and that the eyebrows occasionally become so sparse that they practically disappear. Massage and shampoos may help prevent the loss of hair, but assurance can be given that all will return to normal in due time. In most cases the head should be washed once a month and the scalp brushed daily.

INTERCOURSE DURING PREGNANCY. — The desire for intercourse in the pregnant woman is sometimes increased, but more often diminished, and sometimes becomes even repulsive. Among lower animals it is extremely rare and is often a sign that conception has taken place. Some of the savage races punish cohabitation with a pregnant woman with death.

Among the newly married, and especially at a time when pregnancy is not suspected, intercourse is very common and is sometimes a cause of early miscarriage. The pelvic engorgement and shock, incident to intercourse, during the early months of pregnancy, is also a cause of increased nausea and vomiting and increased vaginal discharge. Intercourse should never be indulged in near the time of the missed menstruation, when the uterus is most irritable.

During the later months there is, of course, the danger of miscarriage because of the size of the abdomen, and also the risk of infection. It is often a cause of puerperal infection (childbed fever) following a normal delivery. For this reason intercourse during the last month or six weeks of pregnancy should be entirely forbidden. Whenever possible it should be restricted to the middle three months. It should be impressed on the expectant mother that intercourse has no effect on the sensuality of the child.

CHAPTER X

PATHOLOGY OF PREGNANCY

Minor Disturbances and Discomforts of Pregnancy

MANY OF THE DISCOMFORTS of the pregnant woman are due to her hypersensitive nervous system and the increased alertness of her mind. The cooking of food, or even the thought of taking some oily or distasteful substance, is sufficient to bring on nausea and vomiting. In fact a great many physical discomforts that she would ordinarily pass over or dismiss from her mind in the course of the day's work constantly reappear and exaggerate themselves into morbid forebodings. A simple cold or headache to the average prospective mother seems much more severe than at other times.

Again women are told by their friends to look for and to expect certain uncomfortable conditions. It is not uncommon for women who wrongly think themselves pregnant to manifest all the symptoms of the pregnant state, and for other women who are actually pregnant, but are not aware of the fact, to have none of these disconcerting symptoms. A great many accidental infections and disturbances that have no connection with pregnancy are erroneously attributed to this condition, so that most women unfortunately look upon the pregnant state as a disease of nine months' duration. Occasionally some women actually feel better and improve in health and beauty when pregnant.

As pointed out before, there are certain conditions that are the natural consequences of pregnancy, and it is the duty of every prospective mother to know something about their early appearance, so that they can be checked before grave complications arise. Although a great number of the minor complaints of pregnancy do not require medical attention, it is always best to consult a physician whenever any unusual disturbance occurs.

NAUSEA AND VOMITING (Morning Sickness).—Nausea and vomiting are probably the earliest and most distressing discomforts experienced during the first part of pregnancy. Fully one-half, or more likely three-fourths, of all prospective mothers suffer from nausea to some extent. It is more frequent and is more severe in the first than in subsequent pregnancies. It is so frequently a symptom that a great many women look forward to the appearance of nausea as the confirmation of a suspicion of pregnancy, and therefore regard it as a natural consequence. Its duration and severity vary in different individuals and in different pregnancies. The distress is somewhat comparable to seasickness. Most often there is only a loss of appetite for certain foods, or an uncomfortable feeling in the morning after getting out of bed. Occasionally it persists throughout the day, or it may occur just before or just after eating. A few women suffer only in the evening, while others suffer one day and feel well the next. Morning sickness may become so severe that the vomiting becomes persistent and requires the interruption of pregnancy to save the mother's life. It has been known to begin as early as the third week of pregnancy and persist to the end. But usually it begins about the sixth week and ends about the time life is felt, which is approximately the eighteenth week.

Much time has been spent and considerable experimentation has been done to determine the cause of morning sickness. The fact that its onset and severity are so variable in different women is proof enough that the cause cannot be the same in all individuals. In a vast number of cases it is the result of the nervous irritability or instability of pregnancy, and as a rule is much more common and more severe in the highly intellectual or the idle classes. A woman with an unsteady or tense nervous system is easily and quickly upset by any preëxistent local irritation or infection. For this reason the teeth, tonsils, sinuses, appendix, stomach, gall bladder, and intestines should be carefully gone over for foci of infection. In a few cases a backward displacement of

the uterus may be the sole cause and may be relieved by simply freeing the uterus from its incarcerated position. In a vast majority of cases nausea is due to pelvic engorgement. The increased circulation, together with the instability of the maternal vascular system during pregnancy, increases the venous congestion in the pelvic organs and sets up a reflex irritation. It is probably because of this unstable vascular system that this sick feeling is most noticeable upon assuming the upright position. On getting out of bed, the blood rushes to the dependent parts of the body, that is, to the lower extremities and pelvic organs, or away from the brain and higher centers. The patient feels faint, becomes dizzy, and very often vomits. When the vasomotor system (blood vessels) regains its normal tone, the condition passes off and the patient goes about her work free from symptoms during the rest of the day. Rarely is a patient nauseated while in the recumbent position.

Much can be done in the way of prevention and treatment. Hygienic care is most important in all cases. Vomiting, like most conditions, may become a habit and grow worse if something is not done to check it. Every effort should be made to prevent the initial attack. Usually the simple institution of rational living is sufficient to prevent it altogether. A hopeful and healthful frame of mind plays an important part in lessening the severity of the condition. It is best to avoid all mental excitement, such as worry, anxiety, grief, arguments, and all violent physical exercise or tedious work. Women should not regard nausea and vomiting as normal accompaniments of pregnancy and expect these conditions to last for three or four months. Mental suggestion plays as much a part in their cause as it does in their treatment.

Diet also plays an important part in both cause and treatment. The mere lack of food within the stomach is sufficient to bring on a loss of appetite and often initiates a disagreeable feeling, just as its counterpart, the overloading of the stomach, will cause distress. For this reason every woman suffering from nausea and

vomiting should attempt to keep something in the stomach at all times. It is a good plan to eat a small amount at frequent intervals, i. e., eat six to eight times daily instead of three large meals. The diet should consist largely of carbohydrates, because they are most easily retained and most readily digested. (See chapter on Diet.)

A good plan is to carry about small packages of sweets, such as lifesavers, lemon drops, or peppermints, according to the individual taste, for use when distressed. When the nausea becomes more troublesome or vomiting is more or less persistent, the ingestion of baking soda or magnesia will often lessen the discomfort. Occasionally it is desirable to drink a full glass of warm water containing a teaspoonful of soda. If vomited, this will wash the stomach and relieve the nausea. A few women find that, if once the stomach is emptied of the accumulation of gastric secretions or retained food, their aversion to food is alleviated and for the remainder of the day they relish their meals. If the vomiting becomes so annoying that very little food is retained, a good plan is to begin, before getting out of bed and before raising the head from the pillow, to eat some dry crackers or biscuits or drink a glass of milk, milk and cream, or a cup of tea or coffee. This will usually be retained and pass out of the stomach into the intestines, where it cannot be vomited after getting up. Some patients will find it helpful to lie down after each meal. Occasionally it is necessary to eat concentrated food, such as thick mush, nuts, crackers, or dry bread, without liquids, which cannot be vomited. Counterirritants over the stomach, such as a hot-water bottle or mustard plaster, are helpful in some cases. Mild alkaline laxatives, such as milk of magnesia or magnesium oxide, will help counteract the acid condition of the blood and promote the excretion of accumulated waste material.

Severe and incessant vomiting is a sign of an impending toxemia and should be under the special care of a competent physician. It is believed by some that pregnancy inhibits the

absorption of certain internal secretions, and that by giving glandular extracts, hypodermically, this can be corrected. The latest hypothesis assumes that the severe types of morning sickness are produced by a retention or lack of excretion of certain toxic substances which produce an acid condition of the blood and injure, principally, the function of the liver and kidneys. This is technically known as "pernicious vomiting of pregnancy." If this toxic condition is allowed to continue, a permanent damage is done to these organs, and the lives of both mother and child are endangered.

Persistent cases of nausea with vomiting should be sent to the hospital for treatment. There they are put to bed in a quiet, darkened room and visitors excluded. The stomach is washed out with soda and water and all food by mouth discontinued until vomiting ceases. The patient is given large amounts of fluid by rectum, or by vein if it is not retained that way. It has been shown clinically that glucose with insulin will hasten the recovery and relieve the majority of these toxic cases. Abortion is never done except to save the life of the mother.

"HEARTBURN" or **"HYPERACIDITY."** — This condition, which sometimes becomes very annoying, has really nothing to do with the heart, but is the result of a hypersecretion of acid in the stomach. It is frequently spoken of as gastric distress and is described as a hot or burning sensation, beginning in the stomach and mounting to the mouth. It is commonly associated with nausea and vomiting and indiscretions in diet. The treatment of this condition should be such as will either retard the gastric secretion or neutralize the acid condition. It has been shown clinically that one-half glass of cream, taken one-half to three-quarters of an hour before the heartburn usually occurs, will retard the gastric secretion and prevent an attack. If this does not relieve the distress, the excess of acid should be neutralized by the ingestion of some antacid, such as milk of magnesia,

magnesium oxide, soda mints, or baking soda. On the other hand, fried foods, or foods that remain in the stomach for a long time, should be avoided.

SALIVATION or **PTYALISM.** — The salivary secretion is normally increased during pregnancy, but occasionally the mucus becomes annoying and constantly dribbles from the mouth. It is usually associated with nausea and vomiting and is probably due to the same cause. The treatment is, therefore, the same as for nausea and vomiting. Drugs are of little value. Sodium bromide in twenty-grain doses is sometimes helpful. Atropine has little, if any, effect upon the condition and is not advisable. The chewing of gum and the application of heat to the cheek will help temporarily. In very annoying cases a saturated solution of potassium chlorate, used several times hourly as a mouth wash, will sometimes be of service.

FLATULENCE or **GAS.** — The distention of the stomach and intestines with gas is a common and uncomfortable symptom of pregnancy. It is due to the sluggish action of the intestine and the fermentation of starchy foods by bacteria. Occasionally it is due to the swallowing of air. Freedom from constipation, regulation of the diet, and the administration of intestinal antiseptics are important factors in preventing and relieving this condition. All foods that cause gas, such as beans, corn, starchy foods, and rich desserts, should be restricted. Predigested milk, or milk containing bacteria, which prevents gas formation, is helpful. Mild alkaline laxatives are also advisable.

VARICOSE VEINS.—Varicose veins are very common in the later months of pregnancy in women who have given birth to several children. They are frequently seen in young women who are born with thin vessel walls. In 25 per cent of all pregnancies they cause more or less discomfort. Varicose veins are not con-

fined to the lower extremities; they occur in other parts of the body, about the external genitals and anus. In the last location they are commonly spoken of as *hemorrhoids.* In the legs they sometimes give rise to burning and tingling sensations and are accompanied by swelling of the feet and ankles, and occasionally by muscular cramping. It is not uncommon in extreme cases for the veins to become inflamed and painful. Occasionally they rupture and bleed into the tissues beneath the skin, giving rise to a bluish discoloration. Alarming hemorrhages are extremely rare.

The primary cause of varicose veins, as pointed out above, is the weakening of the vessel wall, and the lack of vasomotor control, which allows the vessel to become overdistended, and the blood to stagnate. Increased abdominal tension, the upright posture, and mechanical obstruction to the venous circulation by the growing uterus, tend to aggravate the condition. It is well to remember that once the veins become distended they tend to become worse, but if treatment is begun as soon as they appear, the veins will usually regain their former caliber. For this reason, at the first sign of their distention, the patient should keep off her feet as much as possible. All constrictions about the body and limbs should be removed. At frequent intervals she should rest with the feet supported on a chair or lie down with the legs elevated. It is a good plan to support the veins by a spiral bandage or elastic stocking, when walking.

A satisfactory bandage may be made by cutting flannel strips on the bias, three inches wide, and neatly sewing the ends together, to make a strip eight or nine yards in length. The veins should first be emptied by elevating the legs and the bandage applied by beginning at the feet and winding upward. Elastic stockings are more expensive, become soiled, and soon become displaced and constrict unevenly. All supports should be removed on going to bed and the legs massaged and the skin rubbed briskly. Adhesive strips, applied three-quarters around the leg over the affected part, are helpful sometimes.

EDEMA OF THE FEET.—Swelling of the feet and ankles is usually due to the same conditions that cause varicose veins, but occasionally may develop from kidney disease or a toxemia of pregnancy. Marked swelling or puffiness of any part of the body should be promptly brought to the attention of the physician, as it may be the first symptom of an impending toxemia. If the urine and blood pressure are normal and the edema is not severe, no treatment is necessary. Bathing the feet at night in warm water will lessen the swelling and relieve the soreness.

HEMORRHOIDS or **PILES.** — At the junction of the mucous membrane of the rectum and skin is a network of small veins. When these veins become overdistended with blood, as a result of increased abdominal pressure, or constipation, they may become thrombosed or plugged and form small, tender, painful, and sometimes bleeding, masses, called hemorrhoids or piles. Straining at stool increases the distention and aggravates the condition.

The cause should be ascertained at once, and appropriate measures, such as the relief of constipation, should be instituted to relieve this condition. Lying down and the use of cocaine ointment will often give temporary relief. If the hemorrhoids protrude, they should be covered with vaseline and replaced at once, otherwise they will swell, become painful, and ulcerate. Sitz baths and hot packs applied to the affected parts will lessen the pain and help release the accompanying spasm of the sphincter muscle. They can then be replaced without difficulty and the pain relieved by the insertion of a soothing suppository. As a rule the hemorrhoids disappear or shrink into innocent fibrous tabs. Sometimes the condition is so persistent and so annoying that surgical treatment is necessary for relief.

CRAMPS IN THE LEGS.—Cramps or spasms in the muscles of the lower legs are common in the last few weeks of pregnancy.

They are at times very annoying, and keep the patient awake at night. Other than this, they are of little consequence and should cause no alarm. They are the result of pressure and irritation of the spinal nerve trunks by the pregnant uterus. Much can be done to prevent the cramps from coming on at night, by gentle massage of the muscles, the application of hot cloths, and the elevation of the feet. Forcible overextension of the leg at the time of an attack will relieve the pain.

NUMBNESS AND TINGLING OF THE ARMS AND LEGS.—These sensations are most frequent in highly nervous individuals and soon pass off. They are the result of the nervous instability of pregnancy. They need never cause any anxiety or fear. The institution of hygienic measures and the employment of mental diversion are usually sufficient to relieve the annoyance.

BACKACHE.—Backache is probably the most common discomfort of pregnancy; it is so common that most women regard it as a part of pregnancy and never even mention it. Occasionally during the later months of pregnancy it causes considerable distress and may force the patient to bed. The mild cases are evidently due to pelvic engorgement and the general muscular weakness of pregnancy, and not to kidney disease, as most women suppose. There is abundant evidence to show that congestion of the pelvic organs causes reflex backache. Pregnancy, like constipation and pelvic inflammation, aggravates this condition. The onset of labor or a threatened miscarriage is often first manifested by dragging pains in the back.

In the later months of pregnancy there is an increase of serous fluid poured into the pelvic joints, which softens and relaxes them for delivery of the child. Occasionally the relaxation becomes so great in the sacroiliac joint of the back, that the bones slide upon one another, causing iliac strain and temporary invalidism.

The wearing of high-heeled shoes, or a pendulous abdomen,

which throws the trunk forward and shoulders back, induces unnatural tenseness and fatigue of the muscles of the back and backache.

The treatment of backache is evidently the treatment of the cause. Pelvic congestion may be partially relieved by lying down, or better by assuming the knee-chest position at frequent intervals during the day. Constipation and bladder irritation should be corrected. Gentle massage or hot applications to the muscles of the back will strengthen their tone. In the mild cases 75 per cent may be relieved by electrical stimulations of the back muscles by diathermy or high-frequency treatments. An abdominal binder or maternity corset will correct a pendulous abdomen and support the muscles of the back. The relaxed pelvic joints are best supported by a tight pelvic girdle or adhesive strapping. In the pronounced cases of backache, sedatives are required. Sodium bromide in twenty-grain doses, or sodium salicylate, grains X, three or four times daily, will partially relieve the pain. Stronger sedatives are seldom required if the patient goes to bed.

PAINS IN THE ABDOMEN.—Pregnant women complain of pains in the lower abdomen during the latter half of pregnancy. Often these pains are due to intestinal colic, constipation, appendicitis, extrauterine pregnancy, bladder irritation, or traction on adhesions. Occasionally tight corsets or waistbands may be a cause. The most frequent causes, however, are varicose veins about the uterus and ovaries and painful intermittent contractions of the uterus. Pronounced pain should be reported to the physician in charge. The nagging pains of varicose veins of the broad ligaments may be relieved by lying down or assuming the knee-chest position.

SHORTNESS OF BREATH.—A few women complain of shortness of breath early in pregnancy. When it does occur at this time it is usually a combination of indigestion, flatulence, and

nervousness, and not a symptom of heart disease, as most women suppose. Toward the end of pregnancy many women complain of shortness of breath after the least exertion. This condition is due to the enlarging uterus, which presses the abdominal contents upward against the diaphragm and limits the expansion of the lungs. For this reason the condition is made worse by lying down. Occasionally the patient has to sleep well propped up with pillows or upon a back rest which elevates the thorax.

It is extremely important, however, not to overlook a heart, lung, or kidney condition that may seriously endanger the life of the mother. In these cases the shortness of breath is associated with puffiness of the eyes and feet, palpitation of the heart, or persistent coughing.

FAINTING, DIZZINESS, AND PALPITATION.—These symptoms are often very annoying, but never serious if organic diseases of heart, lungs, and kidneys are excluded. Often the vasomotor system, which is the mechanism that controls the heart and regulates the caliber of the blood vessels, does not react properly. When this nervous control of the blood vessels fails to respond properly, the patient becomes dizzy or may faint on rising. Anything that tends to lower the vitality, such as loss of sleep, improper diet, lack of exercise and recreation, tends to increase this instability. As a rule these patients have a lowered blood pressure, often not over 100 m.m. pressure.

The treatment should be such as will build up the general tone of the body by hygienic and dietetic measures. Aromatic spirits of ammonia will give temporary relief.

Palpitation is most often a sign of nervousness and may be relieved by diverting the mind from the heart, by sipping a cold drink, or by taking small doses of bromide. All patients suffering from this condition should avoid excitement.

CHAPTER XI

PATHOLOGY OF PREGNANCY (Continued)

Serious Complications of Pregnancy

It is in the prevention of the more serious complications that obstetrics has made its most noteworthy progress. It has taken years of bitter experience, experimentation, and study to bring about this great change. Progress came about in the modern age by scientific investigation and many of those who oppose science, which is really applied common sense, would probably never have been born except for such knowledge. This is the day and age of preventive medicine. In order to prevent successfully any disease, it is necessary to know something about its cause. Fortunately science has discovered the causes of many of the complications of pregnancy, and in order to avoid their occurrence, prenatal care has been suggested, and is now being practiced by most of the prospective mothers of today. Prenatal care means more than the jotting down of the name of the patient and the estimated date of confinement. It means the systematic coöperation of physician and patient in the prevention of the serious complications of pregnancy. Theoretically, pregnancy may be physiologic, but from a practical standpoint it is pathologic, and many of the pathologic conditions of childbirth may be prevented by intelligent supervision and coöperation of physician and patient. If the physician has instructed the patient to be on the lookout for certain dangerous signs and symptoms, and the patient reports these promptly, many of the hazards of childbearing may be removed.

During the last quarter of a century the laity have been educated to the fact that most childbed fevers, miscarriages, and toxemias are the result of ignorance or negligence on the part of the physician, the patient, or both. Pregnant women in recent years have shown a disposition not to accept doctors whose re-

sults are not good. They prefer the doctor who takes a deep interest in his work and keeps his patients free from complications.

TOXEMIA OF PREGNANCY.—During the later months of pregnancy or near "term," when the development of the child is proportionately greater and the amount of waste materials to be excreted is rapidly increasing, a few women develop a toxic condition or poisoning of their bodies. Some physicians maintain that pregnancy is a toxic state throughout, that "morning sickness" is one of the early symptoms, and that pernicious vomiting and convulsive toxemia are only an exaggeration of a mild form that exists in every case. If mild toxic conditions are not recognized early and the poisoning continues without treatment, some of the important organs of the body, particularly the liver and kidneys, become damaged, and toxemia with convulsions, spoken of as *Eclampsia,* is apt to occur. During the past generation convulsions of pregnancy were so common that most women had either heard about or seen some unfortunate prospective mother who was suffering from this terrible and hazardous state. Today eclampsia is, for the most part, a preventable condition and its occurrence should be looked upon as the result of inefficient or improper prenatal care.

The prevention of this serious condition requires intelligent supervision throughout pregnancy, and this cannot be accomplished without proper coöperation between doctor and patient. It is principally to prevent eclampsia that the physician insists that the patient report at frequent intervals for blood pressure readings and urine examinations.

Although the exact cause of toxemia of pregnancy is not definitely known, careful observation and study has shown that it is in some way due to the liberation of toxic substances from the developing child. Toxemia is, therefore, thought to be the result of the accumulation of these poisonous bodies in the maternal blood stream, brought about either by the failure of their elimina-

tion, or by their failure to be rendered innocuous. Their presence causes an acid condition of the body, which destroys the function of the liver and kidneys and endangers the patient's life. For some unknown reason toxemias are more severe and more frequent in first pregnancies.

The physician, for the most part, depends upon the pregnant woman for the detection of certain danger signals, which are the forerunner of this condition. It is true, however, that these precursory symptoms may be entirely absent and the approaching eclampsia can be detected only by clinical examination of the urine or by an examination that shows an increase in the blood pressure. Some of the early and more common symptoms are persistent headache, nausea and vomiting, swelling of the hands and feet, puffiness of the eyes, dizziness, nervousness and blurring of the eyesight. The urine is scanty and highly colored and usually contains a large amount of albumen. The observance of these early symptoms and the promptness in reporting to the physician for treatment are the means of preventing convulsions. The examination of the urine and the taking of the blood pressure will either confirm or disprove a suspected toxemia.

The treatment of toxemia depends upon the early recognition of symptoms, and the prompt institution of measures to promote elimination of the poisonous substances. Without treatment, more than 25 per cent of the eclamptic patients will lose their lives, and their children are almost sure to die. Even with the best treatment it is always to be regarded as a serious condition. In other words, the most important measure in combating toxemia is the following of intelligent hygienic measures of living and proper, intelligent prenatal care. Any pregnant woman who is under intelligent medical supervision need have little fear of the development of eclampsia.

MISCARRIAGE.—Because of the frequency of miscarriage and its subsequent ill effects, it is necessary to devote some space

to the cause of, and the means of averting, this serious condition. In a previous chapter we have devoted some space to the definition of some of the terms necessary for a clear understanding of the condition. To repeat, medically speaking, abortion is the premature interruption of pregnancy before the beginning of the fourth month; miscarriage is the expulsion of the products of gestation before the end of the sixth month; and premature delivery is the birth of an immature child. Among the laity, miscarriage has come to mean the interruption of pregnancy or expulsion of the products of gestation any time before viability of the child, and premature birth has come to be regarded as the birth of the child before maturity. They look upon abortion as a criminal procedure or the voluntary interruption of an unwelcome pregnancy at any time before the seventh month. A considerable number of physicians, as well as the laity, speak of miscarriage interchangeably with abortion, so, in order to avoid confusion, we will speak of miscarriage, hereafter, as the interruption of pregnancy before the seventh month.

The frequency of miscarriage is much more common than is naturally supposed. It has been estimated by many physicians that one out of every five pregnancies end before the child becomes viable. Miscarriage is much more common in subsequent pregnancies, and becomes more frequent the more children the patient bears, and the nearer she approaches the change of life. One pregnancy following closely upon another is a frequent cause. Miscarriage is more common in women who have had previous miscarriages, and in some patients the condition occurs about the same time in each instance, and becomes a habit, which is technically known as "habitual miscarriage." A great many miscarriages are overlooked because they occur near the first menstrual period, following impregnation, and are regarded as slightly abnormal or irregular menstrual periods. Excessive intercourse, which causes a congestion of the pelvic organs, is more frequently a cause of miscarriage than is naturally supposed.

In recent years a deficiency of calcium in the diet is believed to be the principal factor in most cases of habitual miscarriage.

Some of the mechanical devices which are sold by the drug-stores for the prevention of pregnancy are not preventive measures in any sense, but are mechanical devices designed to interrupt an early implantation of the ovum. As a general rule the more mature the pregnancy, the less likely is miscarriage or premature birth to occur.

The causes of miscarriage and premature labor are many and may even be different for the same patient. Probably the greatest cause of miscarriage is the interruption of pregnancy by criminal interference, either by the patient or by a professional abortionist. To interfere deliberately with pregnancy with the avowed purpose of destroying an unwelcome child, or to conceal an illegitimate pregnancy is selfish, sinful, and criminal, and in the eyes of the law is regarded as manslaughter or murder, according to the intent for which it is perpetrated. The untold misery and invalidism caused by such ugly operations are due to the unnatural, unclean, and unscientific proceedings to which the criminal abortionist resorts. The use of drugs with criminal intent is no less a crime, but less likely to cause invalidism. Their action is questionable and will be discussed later.

The interruption of pregnancy is only justifiable if the patient's health is such that its continuance will endanger her life. The law will permit such *therapeutic abortions,* if done openly, in a reputable hospital, after careful consultation with one or more reputable physicians.

The most likely time for miscarriage to occur is at or near the first or second menstrual period, when the reproductive organs are most irritable. The most frequent cause (except criminal abortions) is the insecure attachment of the ovum to the lining of the uterus. This is due either to an improper development or diseased condition of the ovum itself, or to a poor implantation of the egg, because of a deficient or diseased lining of the uterus.

Medical opinion is divided as to which is the greater cause, some maintaining that most miscarriages are the result of defective development of the egg and that nature deliberately eliminates it to prevent the birth of defective children. The majority of physicians, however, are inclined to believe that a diseased condition of the lining of the uterus is responsible for the majority of miscarriages. This view is by far the more likely, because we know that as time goes on the pelvic organs are apt to become inflamed or displaced, and the physical structure or constitution of the maternal organism is deteriorated or lessened by certain recurrent diseases, such as kidney trouble, diabetes, tuberculosis, syphilis, anemia, etc. Anything that causes fatigue or unnecessary exertion is obviously harmful and should be avoided.

Some of the reasons that are considered as causes among the laity, such as reaching, overstretching, and excitement, are more likely coincidences than primary causes. Drugs and emotional conditions, such as sorrow, anxiety, or intense joy or grief, do not play so great a part in producing miscarriages as most women think. The variety of drugs and the number of illegitimate pregnancies that occur are themselves sufficient proof that no specific drug or medicine will upset a normal, well-established pregnancy. If any one drug would interrupt pregnancy it would be used by reputable physicians in producing miscarriage to save the life of the mother, rather than the subjection of the already debilitated woman to a surgical operation. In order for any drug to bring about an abortion it must necessarily be strong enough to poison the body of the mother, as well as to kill her child. The efficiency of certain drugs sold for the purpose of interrupting pregnancy is extremely doubtful. The woman either was not pregnant in the first place, or the attachment of the ovum was already insecure, and their employment only hastened the inevitable process. Often a menstruation is delayed and some drug of a mystic character is taken; the normal period follows and the would-be abortionist is led to believe that the medicine did the

work. It is not uncommon for women who are nursing babies to skip one or two periods and deceive themselves in this manner. Castor oil in large doses will not interrupt pregnancy unless the ovum is already blighted, or the lining of the uterus is not in a healthy state. Large doses of quinine have no effect upon pregnancy when taken for the treatment of malaria. It is true, however, that a combination of these drugs will induce labor near term, for the simple reason that the placenta has already ripened and become partly detached.

Miscarriage is so common that most women are able to recognize its onset and take treatment before it becomes inevitable. In a typical case the early symptoms are backache, such as most women suffer at their regular menstrual periods, pain or cramps in the lower abdomen of variable intensity, and bleeding from the vagina.

There are a few patients who appear to have one, two, or even four irregular menstrual periods following conception, but these cases are so very rare that all cases of bleeding should be viewed with suspicion and considered as a partial separation of the attachment of the placenta, which might lead to miscarriage. Bleeding at any time should arouse the suspicion of a pregnant woman and should be immediately reported to the physician in charge. If the doctor cannot be reached, the patient should remove all clothing, go to bed, and relax as much as possible. Rest in the recumbent position lowers the blood pressure and relieves nervous tension. Absolute rest in bed will avert fully half of the cases of threatened miscarriage. If the symptoms of a threatened miscarriage are allowed to continue, the condition soon becomes one of inevitable miscarriage and continued bleeding will endanger the life of the embryo, and stimulate the uterus to contract. As a general rule it is safe to assume that in the first three months of pregnancy, if the bleeding is less than at a normal menstrual period, the pregnancy will not be interrupted, but if bleeding is

more than at the regular period, contractions will continue and miscarriage will follow.

Many patients become alarmed and panic-stricken at the sight of blood, but it is only in rare instances that hemorrhage in the early months becomes so severe that the life of the patient is jeopardized. In other words, severe hemorrhage or flooding may cause considerable apprehension to the patient, but rarely, if ever, does it endanger her life. The danger from hemorrhage is due to the fact that loss of blood lowers the vitality and resistance of the patient to subsequent infection.

As stated above, the pain associated with miscarriage is extremely variable, depending upon the individual. It varies just as the pain of menstruation varies in different individuals. Pain from menstruation or miscarriage is due to the expulsive effort of the uterus to empty itself. In rare instances miscarriage occurs without pain, but most cases suffer more or less. Early pain is often confused with intestinal griping or stomachache, but pain with vaginal bleeding should seldom be mistaken for gas pains. The pain from miscarriage is never so intense as that of difficult childbirth, although some women assert that it is much worse at the time. As a general rule the nearer maturity the pregnancy, the more severe the pain. The average woman regards miscarriage too lightly. She feels that because the pain has ceased, and the bleeding has decreased, she need no longer stay in bed. If she knew the complications that so frequently follow miscarriage, and the lifelong invalidism brought on by lack of care, she would soon disabuse her mind of such mistaken ideas. The uncomplicated miscarriage should have the same after-treatment as the uncomplicated full-term delivery.

In the early part of pregnancy, the products of gestation are expelled *en masse,* but in later cases the cervix dilates, the membranes rupture, the fetus is expelled, and the afterbirth proceeds to come away in bits. The retention of placental tissue is the cause of profuse and prolonged bleeding and predisposes to in-

fection. It is for this reason that incomplete miscarriages are taken to the hospital for curettage, which is the best means of restoring the lining of the uterus to a healthy condition.

Infections following early abortion are usually the result of criminal interference. Miscarriages that have had proper surgical care are seldom serious, and recovery is more rapid than after normal deliveries.

As a word of warning it is always best not to regard miscarriage too lightly. It is wise to save everything that passes from the vagina for the doctor's examination. It may be that all the products of gestation have passed and no pelvic examination will be necessary. On the other hand, that which may be regarded as an innocent miscarriage may be the danger signal of an *extra-uterine pregnancy,* or pregnancy outside the uterus. This serious anomaly usually occurs about the sixth week of pregnancy, when the growing embryo begins to erode the large vessels that supply the reproductive organs. The first warning is usually a sharp stabbing pain in the lower abdomen, which causes the patient to cry out or faint. This is followed shortly by other attacks and by most of the symptoms of a threatened miscarriage, for which it is frequently mistaken. This condition calls for surgical intervention to prevent the patient from bleeding internally.

Premature delivery is a term used to denote the delivery of a child before maturity, which is capable of living if given proper and adequate care. The causes of premature delivery are the same as those of miscarriage, except that criminal interference is much less frequent. Premature delivery occurs less often than miscarriage, and is generally the result of some constitutional disease, which interferes with the health of the patient and the completion of pregnancy. Often physicians induce premature labor to relieve some organic disease of the mother, which would become more serious if pregnancy were allowed to go to term. Occasionally labor is induced prematurely to save the life of the child.

In premature delivery the child is smaller, the labor is somewhat shorter, and the bleeding slightly less than in full-term delivery. The treatment of the mother is the same as for full-term delivery, but the treatment of the child is markedly different, because of its underdevelopment.

There are numerous ways of estimating the age of the child, or its stage of development. Ordinarily, a child born after the twenty-eighth week is viable and its chance of living is in direct proportion to its age. The more mature the child the more likely it is to live. There is no foundation for the supposition that the seven months' baby will thrive better than an eight months' baby. It is a fallacy handed down through the ages from the old belief that seven was a lucky number, just as thirteen is considered unlucky today.

Since we do not know the exact date of conception, we are sometimes in doubt as to the length of intrauterine life, or the stage of development of the child. A better method of determining viability is to ascertain the weight and length of the child at birth. It is safe to say that a premature infant of less than three pounds will not live, but if it weighs more than four pounds, or is at least sixteen inches in length, it will more than likely live, if given proper care. With good care most of the babies between three and four pounds will thrive; with inadequate care most of them will die. The viability of the child, as you will note, is therefore dependent upon its development and care.

A frequent cause of death in premature infants is exposure. The infant's heating apparatus is so poorly developed that any change in temperature is a shock to its delicate constitution. The layer of fat that clothes the mature child is absent in the premature baby, so that changes in temperature have to be prevented by artificial means. As soon as the premature child is born, its tiny body should be covered with oil to prevent loss of heat by radiation, and wrapped (not dressed) in some previously warmed gauze, cotton, or prepared wool. The more modern hospitals have

soft wool dresses or blankets prepared especially for this purpose. The child should then be placed in a deep basket, filled with soft pillows and blankets and surrounded by a warm water bottle, to keep it at an even temperature. Some hospitals have an incubator which maintains a constant temperature of 90 degrees.

The second most common cause of death in premature infants is the lack of development of their digestive apparatus. Many premature babies die from starvation, for this reason. In the first place the child may not be strong enough to nurse, and in the second place the digestive juices are either absent or so diluted that food cannot be properly assimilated. Because of this lack of development it is essential that the child be given mother's milk, which is more easily and agreeably digested than any other form of food. It should be partially diluted with sterile water and fed to the infant with a medicine dropper or spoon, at short intervals.

Too often premature infants die as a result of too much handling and exposure by overzealous nurses and mothers. The infant should be uncovered only in a warm room and not washed but rubbed daily with warm sweet oil. It should be changed when necessary and not picked up when it cries, but turned from side to side at intervals and allowed to sleep as much as possible.

INFECTION OF PREGNANCY. — Probably the most serious and yet the most preventable complication of pregnancy is puerperal infection, popularly known as "childbed fever," "sepsis," or "blood poisoning." The cause of this condition, as everyone knows today, is the introduction of infective microorganisms before, during, or following labor into the open sinuses of the uterus or the wounds of the birth canal. Childbed fever has occurred as long as children have been born, and the history of puerperal infection is a dismal chapter in the progress of medical science. During the past century it occurred in epidemics and swept through civilized communities as a scourge, killing thou-

sands of innocent mothers and seriously invaliding many more. It was most prevalent in hospitals where patients were in close contact; so that pregnant mothers regarded hospitals as pest-houses, the entrance of which meant their exit from this world. In pre-antiseptic times, from 2 to 6 per cent of pregnant women died from sepsis, and frequently epidemics occurred where more than 10 per cent of pregnant women lost their lives from this single cause. In the better maternities of today, less than one-quarter of 1 per cent of pregnant women die from infection.

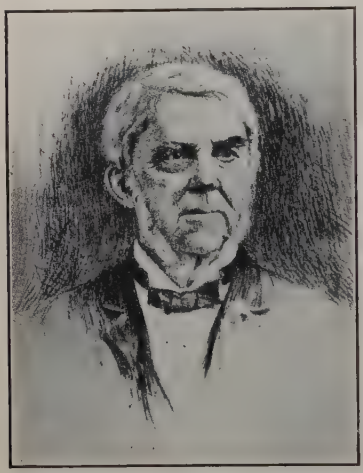


FIGURE 19. *Oliver Wendell Holmes, Professor of Anatomy at Harvard Medical School.*

In 1843 Oliver Wendell Holmes, who was then a practicing physician of Boston, observed the contagiousness of childbed fever and read a paper before the Boston Medical Society, accusing the doctors and midwives as the carriers of infection (Figure 19). He firmly believed and clearly showed that at least the epidemic form of "private pestilence," as it was then called, followed the paths of certain physicians and nurses who were careless in the manner in which they handled their cases. He relates a number of instances of positive infections, of which the following is only one example:

> A physician in that town (Boston), Dr. C., had the following consecutive cases:
>
> Patient No. 1, delivered March 20, died March 24.
> Patient No. 2, delivered April 9, died April 14.
> Patient No. 3, delivered April 10, died April 14.
> Patient No. 4, delivered April 11, died April 18.
> Patient No. 5, delivered April 27, died May 3.

Patient No. 6, delivered April 28, had some symptoms, recovered.
Patient No. 7, delivered May 8, had some symptoms, recovered.

These were the only cases attended by this physician during the period referred to. They were all attended by him, until their termination, with the exception of Patient No. 6, who fell into the hands of another physician on the second of May. (Dr. C. left town for a few days at this time.)

Holmes was bitterly attacked by the leading obstetricians at the time, but lived to see the fruits of his efforts. Fifty years later he wrote, "Others had cried out with all their might against the terrible evil before I did, and I give full credit for it. But I think I shrieked my warning louder and longer than any of them, and I am pleased to remember that I took my ground on the existing evidence before the little army of microbes was marched up to support my position."

About 1847, Semmelweiss of Vienna and Tarnier of France proved that childbed fever was wound infection and spread by contamination from one case to another. It was about twenty-five years before the infective nature of childbed fever was generally accepted by the physicians, and another quarter of a century before its prevention became a reality. It was because of childbed fever that antisepsis and sterilization were first suggested, and the modern surgery of today has come about as a result of careful observation, study, and experimentation for the prevention of puerperal infection.

Patients occasionally become infected following delivery under the most ideal conditions, because other factors enter into the problem. The patient may have become infected before entering the hospital, either by intercourse shortly before delivery, or by the introduction of infective material by bathing or other means. Again certain conditions that lower the vitality or resistance of the patient may allow the invasion into the tissues of bacteria, which are always present in the vaginal tract. Constitutional diseases, injury to the tissues of the birth canal, or undue loss of blood, which lowers the resisting power of the individual, may

allow mild infection to become serious. As a rule, however, infections that develop in spite of aseptic care are mild and less serious than those contracted where little or no attempt has been made to avoid contamination. Childbed fever has been practically eliminated by the sterilization of every article, instrument, or utensil that comes in contact with the patient. The doctor must also carefully disinfect his hands and wear sterile gloves at every examination. It may be a simple matter to kill bacteria before they come in contact with the devitalized tissue, but it is a serious matter to rid the body of them once they have invaded the tissues. Patients who suffer long, tedious instrumental deliveries are more apt to develop puerperal sepsis because the danger of introducing infective material is greater, and the resistance of the patient has been lowered by fatigue and loss of blood. There is also more or less injury of tissue and devitalized tissue will not resist infection.

The physician is occasionally criticized for his extreme carefulness in his endeavor to avoid contamination, but such injudicious censure comes from those who have not yet learned the value of surgical cleanliness. If antiseptic precautions were not strictly followed, the epidemics of the past would again appear. Today the medical profession has come to look upon puerperal infection as the result of carelessness or negligence on the part of the attending physician or nurse. A simple error in surgical cleanliness may cost the life of an individual or cause untold misery and suffering. Many physicians are able to deliver hundreds of cases without a single infection, because they are willing to take the time and trouble necessary to avoid contaminating their patients.

CHAPTER XII

PREPARATION FOR DELIVERY AND PLACE OF CONFINEMENT

Scientific medicine has spread so rapidly during the past twenty-five years that most women of the present generation have little idea what the past generation had to suffer and endure in order to bear children. There are now none of the frightful epidemics of childbed fever that swept over the country during the last century, for scientific investigation has discovered the cause and surgical cleanliness will forever prevent their repetition. Most prospective mothers of today realize the value of preparation and are eager to know how they may best preserve their future health. There are a few, however, who still regard childbearing as a "natural process" and desire no other special attention than that which is absolutely necessary at the time of delivery. Such misguided patients call for a doctor or midwife after labor has begun and are delivered with little or no preparation. They regard the detail of cleanliness as embarrassing and unnecessary because of their ignorance of its real value. It is true that the big majority escape without any serious injury, but the few that do develop infection or other complications are the patients that make up the bulk of the complicated cases that are treated, or die, because of their own negligence.

A great amount of criticism and prejudice against the hospital during the past generation was due to the fact that it was used as the place of last resort. When all home remedies had failed and the patient's condition appeared hopeless, she was rushed to the hospital. Although the cause of her illness was contracted outside of its walls, the hospital was more than likely blamed for her death. As a matter of fact, a patient who has been prepared in a modern maternity institution rarely develops infection, and when it does occur it is rarely serious. For this reason the hospital

method is now the model of all preparation, and patients who are delivered at home are prepared in a similar manner.

Those who have read the preceding chapters cannot help but be impressed with the importance of preparing for confinement. The success of modern obstetrics rests upon the prevention, rather than the treatment, of sick cases. All that has been said in the previous chapters has been written to prevent complications. Infection is the most serious and the most fatal complication of all. It is the most outstanding cause of chronic invalidism and a frequent cause of permanent sterility.

Prevention of infection depends entirely upon the details of preparation. In the hospital the nursing force attends to all these details, so that the patient need not concern herself about them. But in the home, most of the dressings and other arrangements have to be made by the patient, with the help and guidance of the nurse. The failure to observe some supposedly trifling detail has resulted in untold misery and many deaths. For this reason no detail in preparation, no matter how unnecessary or absurd it may seem, should be carelessly omitted. In the hope that childbirth may be rendered less serious, a few details for a successful delivery will be described.

Oftentimes the patient is undecided whether she will be confined at home or in the hospital. The modern surgical hospital or lying-in hospital, which is especially equipped to handle maternity cases, has distinct advantages over the home. Each year more patients are realizing the superiority of such institutions and an increasing number are receiving the advantages which they offer. Although the majority of women are still confined in the home, it is only a matter of time when practically all patients will be taken care of in the hospitals. As a matter of fact, the number of women who live where such hospitals are available, and who take advantage of them, have already surpassed the number delivered in the homes.

As a result of this increased tendency, there have sprung into existence a number of poorly equipped institutions, called "Maternity Homes," which are not hospitals, except in name. A great many of these institutions are supervised by semitrained or "practical" nurses, and sponsored by unscrupulous doctors who use this means of securing patients. The equipment in these institutions is poor and the conveniences may be, and usually are, no better than those of the average home. Because of the lack of room, infected patients are allowed to come in contact with "clean cases," so that infection spreads from one patient to another in rapid succession, through the untrained nursing staff. A few deaths occur and the institution closes its doors and moves to a new territory. It is much better to be confined at home than to run the risk of becoming infected in such poorly managed institutions.

In selecting a hospital it is advisable that the physician who has the case be consulted before making a definite choice. He will know where the best care and treatment may be obtained. He will probably have some connection with an institution where he is familiar with all the equipment. Certainly it is far better that the patient attend such a hospital than some institution she may choose, but in which the doctor is a stranger. A hospital should be a place for the care of patients, and not for the convenience of relatives and friends who hope to pay a social call.

It may be that the patient will prefer to remain at home. With the help of the physician she will be able to decide whether it will be for the best. If there has been one or more uncomplicated deliveries, and everything is apparently progressing satisfactorily, it may be more convenient and more advantageous for her to remain at home. But if there is the likelihood of some complication, it is very important that she go where such emergencies may be promptly and properly met. First deliveries are always better attended in the hospital, because in these, labor is longer and the vitality of the patient is likely to be lowered, and

the unexpected is more apt to occur. Again, the chance of infection is much less in the hospital.

There are several distinct advantages that the hospital has to offer. In the first place it is more economical if the patient is desirous of the best care, and good care in a modern surgical hospital may be obtained for practically the same price as that of a trained nurse at home. If the patient take into consideration the salary and the maintenance of such a nurse at home, the surgical supplies and preparations necessary for delivery, and the board and laundry of herself and baby, it will be found to cost considerably more than the equivalent care in a first-class hospital. Then there is the distinct advantage in the care and discipline that the child receives during the stay in the hospital. Also the visits of relatives and friends may be controlled to the advantage of the patient.

By far the most important advantage that the hospital offers is the care that one will receive in the prevention and handling of complications. Infections are much less frequent in the hospital, for surgical cleanliness is a matter of routine and is strictly adhered to. Every nurse or attendant is trained to avoid contamination, and may be depended upon to give proper treatment in case of an emergency. There are many other advantages. The pain of delivery may be distinctly lessened, and the exhaustion of the patient prevented. Obstetrical tears may be repaired where there is a good light and under sterile conditions. The patient is able to rest better and convalescence is therefore more rapid. Here the patient is impressed with the underlying principles of asepsis, and taught the proper care and handling that her baby should receive after going home.

If the patient has decided to go to the hospital for the delivery of her baby, the doctor who has the case will make all arrangements for the room and procure for her a suitable nurse, if she desire special care. Such nurses are called *special nurses* and devote their entire time to their patients, for which the patient

must pay in addition to the regular hospital fee. These nurses, in uncomplicated cases, are more of a luxury than a necessity, as the hospital provides ample care for the patient.

It is advisable to have a suitcase packed with the articles that are to be taken to the hospital, two or three weeks before the expected date of confinement, in order to avoid last-hour confusion. This suitcase should contain such toilet articles as the patient may require; two or three nightgowns, a dressing-gown, and a pair of house slippers. Most institutions furnish the clothes for the baby during the stay at the hospital. This is done to avoid exchange or loss of valuable articles and to prevent injury to delicate fabrics when laundered. It will then only be necessary to have some relative or friend bring the clothes for the baby a day or so before the time of departure. All surgical dressings, breast binders, abdominal binders, and napkins will be furnished by the hospital.

Many women live in constant fear that they will not reach the hospital in time. This is particularly true in first pregnancies, where the young mother does not know what to expect. The duration of labor in first pregnancies is usually prolonged, so that there is very little likelihood that such a patient will have a precipitate delivery. It is only in rare instances, and always in subsequent pregnancies, that patients do not have sufficient warning to arrive in ample time. The ride to the hospital never does harm, but is often beneficial, as it diverts the attention of the patient and gives her time to reflect and become more composed.

If the patient lives in close proximity to the hospital, it will not be necessary for her to go there before labor pains commence. In first pregnancies it is often preferable to remain at home until the pains have become regular and labor is well under way.

Often the patient is desirous of knowing the length of time that she will have to remain in the institution. The duration of this stay depends upon a number of factors. The principal value of the hospital, as has been shown, is the preparation for the delivery

of the baby; after that, most patients desire to remain until they are able to be up and to attend partially to their own needs. Not all women convalesce with equal rapidity. The stay in bed depends upon the rapidity with which the generative organs return to normal. There is a great individual variation among women in this respect. As a general rule, the average woman is allowed to be propped up on a back rest shortly after delivery, and helped into a wheelchair as soon as the vaginal discharge becomes clear, which is usually about the twelfth or fourteenth day following delivery. It is best for the patient not to urge the doctor to let her up too soon. He knows best how she is convalescing and will allow her to get up just as soon as he feels that everything will be satisfactory.

For various reasons many patients do not desire to remain at the hospital for two or three weeks, and in such cases the patient may be allowed to return to her home in an ambulance after the first week, or in an enclosed car after the tenth or twelfth day, according to the degree of progress she has made. This is not advisable, but is better than to run the risk and annoyance of confinement at home. If the patient goes home before the proper involution has taken place, it will be necessary for her to remain in bed at home until the physician deems it advisable to let her get up.

CARE IN THE HOME.—In this enlightened age no woman should be left to the prejudice and whims of untrained relatives, who know little about confinement, except from their personal experiences. It is true that they give their services freely and willingly, do everything possible for the comfort of the patient; but they cannot give the expert care which only trained nurses can give, and which the patient requires. Any economy that provides irresponsible and inefficient care will be the most expensive in the end. A large number of the deaths and most of the chronic invalidism following childbirth are the result of such false economy.

The prospective mothers themselves are usually responsible for the treatment that they receive, because they do not insist upon having that care that they know is best for them. Many feel that the services of a nurse are necessary, but when the time for the advent of the baby arrives, they find that they have made no provision for her expenses and indifferently accept any proffered help that is available. If every woman would set aside a small amount each month during her pregnancy, she need not be deprived of good care.

The choice of a nurse should be made as early as possible, at least one or two months before the estimated date of confinement, to avoid confusion and the worry of obtaining one at the last minute. The choice should be made with the aid of the doctor in charge, rather than from the recommendation of some friend or relative, since he is much more capable of judging of her professional competency. The patient is too apt to make her choice because of some personal characteristic rather than because of the training that is necessary for the best nursing.

There is always better coöperation if the nurse is familiar with the methods and peculiarities of the physicians in charge. A strange nurse may be well trained and perfectly competent to take care of obstetrical patients, but if she is not familiar with the desires and peculiarities of the physician in charge, it may work to the disadvantage of the patient.

It is not advisable to select a nurse who is a relative or intimate friend of the family, as she is too often governed by sympathy for the friend rather than by sound judgment for her own good. And, too, the patient expects special attention and is often more impatient with a relative than with a stranger. When such a choice is made it is usually because the patient desires to be "petted" rather than nursed, although occasionally a relative is chosen to avoid expense. The nurse who accepts such a case, especially if it turns out to be a bit complicated, usually dis-

covers, to her sorrow, that it would have been much better for her if she had refused.

The nurse should have an intelligent knowledge of what the complications of pregnancy are and how they may best be prevented. She must be competent to give advice and to teach the young mother the value of good hygienic care. A well-trained nurse can practically eradicate puerperal infection. Her handling of the case, therefore, plays a most important part in the health of the mother and babe, following delivery. Also, the training which an infant receives in the first few weeks of life may decide the amount of attention and care that it will require in the following months.

Besides professional training there are other requisites that a successful obstetrical nurse should possess. She must be neat in appearance, sympathetic, and mindful of the comfort of her patient. A nurse who is able to supply a comfort before the desire becomes apparent has ingratiated herself with the patient, and their mutual happiness is increased. Above all, the nurse must be cheerful, optimistic, and agreeable. A disagreeable, ill-tempered disposition is very quickly reflected in the mental repose and convalescence of the patient. For these reasons it is best that the patient seek the help of her physician in making her choice.

Sometimes patients are not able to pay for the services of a trained nurse, and in an effort to economize, they procure a "practical nurse," or "self-trained nurse." These nurses frequently have no other qualifications than a feeling of confidence and a meager idea of surgical cleanliness. They often are so strongly opinionated that the patient suffers because of lack of coöperation with the doctor. They are not altogether to blame for this, because they are encouraged in their conceit by certain doctors who flatter them to gain their assistance in procuring patients. An intelligent girl, who is desirous of learning and is capable of carrying out orders, is far more helpful and less objectionable than some conceited practical nurse who openly vio-

lates modern standards of nursing and scoffs at surgical cleanliness.

There are, however, practical nurses who appreciate the necessity of coöperation in such procedures and are fully as capable as some of the trained nurses who appear disinterested in their work. If the patient has been previously delivered in a hospital, and has seen and understands the methods of preparation and after-care, there is no objection to her securing an intelligent, practical nurse. The physician usually has the address of three or four, and the patient will do well to allow him to choose for her, rather than select one for herself. However, it is less expensive and the patient will receive better treatment if she share a room with another patient in a hospital, rather than remain at home and suffer the inconvenience of incompetent help.

In most of the larger cities there are trained nurses who prepare patients and assist at delivery in the home for a nominal fee. These nurses (nursing services) make a specialty of this sort of work and wash and dress the baby before leaving the case. They also give after-care to those patients who desire it, for a small fee, usually at the rate of one dollar per hour. If the patient has had a normal delivery, and some friend or relative will attend to the regular household duties, the more technical or essential needs of the mother and babe may be attended to in this manner.

The success of delivery depends upon the details of preparation and the care taken to prevent complications before, during, and after delivery. There are certain preparations that must of necessity be made some time before confinement takes place. These should be attended to at least two or three weeks before the estimated date of confinement.

The selection of the room and the furnishings is really of greater importance than most women realize, for it is here that the patient will be forced to remain at least two weeks in bed, and most of the time flat upon her back. A little time spent in

selecting and arranging the room will be appreciated after delivery. If there is a choice of bedrooms, a quiet well-ventilated room with a southern exposure that admits abundant sunlight, and one that is within close proximity to a bathroom, should be selected. These little details may not be essential, but they make the lying-in period more comfortable and the convalescence more rapid.

The room should be stripped of all the unnecessary furniture and furnishings, and thoroughly cleaned. Any room that has been recently used by a patient who has suffered from erysipelas, diphtheria, typhoid, scarlet fever, puerperal infections, or a person with an infective sore cannot be successfully cleaned for the occupancy of a pregnant patient.

Furnishings that are easily moved, such as curtains, rugs, carpets, and bric-a-brac, should be taken out, and the remaining fixtures wiped off with a cloth dampened in a weak solution of lysol. The floor should be scrubbed, if possible, but if the carpet cannot be removed it should be vacuum-cleaned and covered over at the time of delivery with newspapers or some material that will not harbor germs.

An iron or brass bed with good springs, if available, should be selected and thoroughly cleaned. If the springs sag with weight, they should be supported in the middle with several boards laid crosswise beneath them. The top of the mattress should be at least twenty inches above the floor in order to be satisfactory. A low bed makes delivery difficult for the physician and taxes the strength of the nurse in the management of the patient for delivery. (A bed may be raised to the required height by removing the casters and placing the four posts on blocks of wood.) The bed should be placed at some distance from the walls in order to be accessible from all sides, with the foot so arranged as to receive the best light. In addition to the bed, two plain chairs, a comfortable rocker, a small table on which to place dressings and instruments, and a small washstand are all that will be necessary

in the room. The windows should be screened to obstruct the public gaze, and yet admit sufficient light for the repair of any laceration that might develop. A droplight should be available in case the baby is born at night.

A new, firm mattress or one without holes or lumps will be satisfactory. To protect the mattress from soiling, it should be covered with several layers of paper, and over these a piece of oilcloth or canvas pinned. If the oilcloth is long enough to reach over the edge, and is pinned to the under surface of the mattress, it will be held in place better and will prevent the sides from soiling. Over this a clean sheet is tucked in, on all sides. A piece of rubber sheeting which covers the middle half of the bed is laid upon the sheet, or, better still, an ordinary clean sheet may be folded to make a strip about one and one-half yards wide, to be used as a drawsheet. The rubber sheeting may be enclosed within its folds and the drawsheet and all withdrawn shortly after delivery, which will leave the patient in a soft, comfortable, dry sheet. At the time of delivery the sterilized sheets and absorbent pads will be placed above the drawsheet.

As stated above, the nurse should be selected some time before delivery, so that she may assist in the arrangement of the room and in the preparation and selection of the supplies necessary for confinement. The nurse will know from experience what supplies are indispensable and assist in their sterilization. In many cities the linen may be procured already prepared and sterilized, for two or three dollars.

NECESSARY SUPPLIES FOR DELIVERY AT HOME

One nail brush (a cheap ten-cent one).
One small bottle of lysol.
Two enamel pans or washbasins.
One large pail or slopjar with cover.
One bedpan.
One pint denatured alcohol.
Four ounces of boric acid crystals.

One small bottle of chloroform or small can of ether.
One bottle of sterile vaseline.
Two dozen medium and two dozen large safety pins.
One pair of white stockings.
Two cakes of castile soap.
Two bent-glass drinking tubes.
One and one-half yards of double-faced rubber sheeting.
Two pounds of absorbent cotton batting.
Twenty yards of sterile gauze.
One small bottle of sweet oil.
One yard of unbleached muslin, thirty-six inches wide.

TO BE MADE UP FOR STERILIZATION

Two abdominal binders made of stout muslin one-half yard wide and one yard long.

Two obstetrical pads, to be placed under the patient to receive discharges during the delivery. A mat, one yard square and three or four inches thick, is made of cotton batting as a filler, and a thin layer of absorbent cotton to cover the top of the pad, and over all some clean cheap cloth (old sheets) is sewn.

One-half dozen old towels without fringe, or diapers, to be used by the doctor to protect the patient from contamination.

Five dozen sanitary pads to receive discharges following delivery. They protect the patient from contamination, and the bedding from soiling. These pads are made of absorbent cotton or from cotton batting, which is much less expensive, with a thin facing of absorbent cotton on the one side. They are about four inches in width and one inch thick by ten inches in length. The gauze covering them should be wide enough to leave two tails, two or three inches long, by which they may be pinned front and back to the abdominal binder. They should be put up in bundles of six for sterilization.

Two dozen gauze sponges made from fourteen to fifteen-inch squares of gauze with the edges folded inside to make sponges four inches wide. They are to be used to dress the baby's navel cord and to cover constantly the nipples. Do up in three or four small packages.

Four dozen four-inch gauze squares, for cleansing the nipples before and after nursing, and for washing the baby's eyes and mouth. They may be placed in a small jar for sterilization.

Three dozen cotton pledgets. These are twisted balls of cotton about the size of a large plum, to be used for cleansing purposes.

STERILIZATION.—Bacteriologists have proved that disease-producing germs are killed by heat and that moist heat is much more effective than dry heat. In the hospitals a special sterilizing apparatus, which subjects the germs to high pressure and naturally higher temperature, shortens the time of sterilization. If the nurse has access to a hospital or laboratory where such sterilization is done, it can be done thoroughly and without expense.

If the patient is not able to have the dressings sterilized in this manner, sterilization may be accomplished by installments as follows: Secure a large bucket or kettle and into this place a bowl, or better, a strainer, that will practically fill the bottom and support the dressings three or four inches above the bottom. Pour in about two or three inches of water. Place the articles to be sterilized on the top of the strainer, but do not allow them to touch the water (a plate may be used to support the dressings), then cover with a lid. Boil vigorously for forty-five minutes and then remove the bundles (being careful not to open them) and place them in a hot oven or hang them outdoors in the sun to dry. By repeating the process all the articles may be satisfactorily sterilized. After sterilization put everything away in a closed dry place to be used when needed. Any package that accidently becomes open is contaminated and has to be re-sterilized (Figure 20).

FIGURE 20. *Diagram illustrating a method of sterilization in the home.*

In the larger centers there are certain hospitals or nursing services that have maternity bundles already made up and sterilized, which they lend for a small sum, ranging from $2.50 and up. It will save considerable time and worry to obtain such a bundle. The list of articles contained should be checked over, and if the bundle does not contain all the necessary articles, the missing ones should be made up and sterilized.

PREPARATION OF THE BABY'S CLOTHES. — True mothers get a great amount of pleasure in planning and preparing the baby's outfit. Such work helps to divert their attention from the discomforts of pregnancy and apparently shortens the period of watchful waiting.

The tendency in first pregnancies is to make the layette too elaborate, and to neglect the necessary preparations for delivery. The essential points to bear in mind in arranging the baby clothes is to strive for health, comfort, and simplicity. Inexpensive outfits for the baby may be obtained at any large department store, often for less than they can be made. There are also certain companies that make a specialty of baby finery, and they will be glad to send their catalogues for inspection. If the patient has decided to make the child's clothes, it is advisable, before starting, that she get some idea from a ready-made outfit as to what she will need and how to prepare them.

It is well to bear in mind that the first three months of the baby's life will be spent in eating and sleeping. Although the mother may be extremely proud of him, he is not interested in personal vanity at this age, and is much happier if left undisturbed. His actual needs are simple, and these should be kept in mind in preparing the clothes. His clothes should, at all times, be heavy enough to keep his body at an even temperature and yet not too warm for comfort. As a rule babies are kept too warm. The clothes should be made from material that is soft, light, and porous, and large enough not to constrict or interfere with the

free movement of his tiny muscles. He will be more comfortable in a shirt, band, and stockings of silk and wool, or cotton and wool, with diapers, petticoat and blankets of flannel. (If mothers would use less clothing and keep the baby dry and comfortable, they would find him a better natured and better trained child.) The clothes should also be large enough at the neck and arms to allow for growth, otherwise they will have to be discarded before they are worn out and larger ones obtained.

THE LAYETTE

Three abdominal bands; soft flannel strips six inches wide and two feet long.

Three shirts (coat style), silk and wool, or cotton and wool, size 3. All-wool shirts are irritating to the baby's skin.

Four flannel skirts and petticoats (Gertrude style).

Four wrappers (nightgowns) of outing-flannel or sacks that button in front.

Four white slips or dresses of cotton.

Three knit bands with shoulder straps for summer wear, made of part wool. Three pairs of stockings, silk and wool, or cotton and wool.

Four dozen diapers, 18 inches by 36 inches.

A flannel wrap, one yard square, for cool weather.

A cloak, cap, and carriage robe for riding.

ADDITIONAL NURSERY EQUIPMENT.

A soft comfortable blanket.

Three dozen safety pins (different sizes).

Three or four soft baby towels (old linen).

Three or four soft wash towels (old linen).

Hot-water bag with flannel covering (must be tested to make sure it will not leak).

One cake of castile soap.

Boric acid powder (two ounces).

Four ounces of olive oil or mineral oil.

Sterile cotton pledgets.

Crib or bassinet. An old-fashioned clothes basket makes a good bed for the baby, and with a little white enamel the basket may be made more attractive.

A covering for the mattress may be made by folding table matting; this will make a smooth soft pad that can be easily laundered.

One rubber sheeting to protect the mattress (Kleinert's rubber sheeting), 27 inches by 16 inches.

One can baby powder (Zinc Stearate or Borozin).

Bottle and nipple to supply water to baby.

CHAPTER XIII

CHILDBIRTH (LABOR)

In the preceding chapters the patient has been constantly urged to keep herself in a happy frame of mind and in the best physical condition to meet the crucial test of pregnancy, known as labor. This is the stage that tests the metal of the individual, for it is here that most of the accidents of pregnancy occur. There is no other physiological process in life where so much suffering is imposed or where an individual will submit to such punishment without rebelling. It has been a long hard fight to overcome the tendency to regard the function of reproduction as woman's duty, to which she should conform without complaint. There is no other function in life that exacts such a toll in deaths or creates so much chronic invalidism as does nine months of pregnancy, with its culmination in labor. Happily, a great change has taken place in the last fifty years, and there are still greater hopes for the future.

It is well to remember that 90 per cent of all labors at this day and age will terminate without much trouble and are spoken of as "normal labors." This must not be misconstrued to mean that the remaining 10 per cent all end in disaster, for most of these difficult labors can be made less hazardous by proper treatment. Statistics show that there is one maternal death in every 250 maternity cases, that one baby out of every twenty is born dead, and that one baby out of every twenty-six dies during the first month of life. Nearly all of these deaths are the result of birth injuries and are largely avoidable. These are by no means the total injuries to mother and babe, for 50 per cent of all mothers suffer more or less from physical handicaps, in later life, and many of the infants develop conditions which destroy their usefulness for the remainder of their lives.

Half of the immediate maternal deaths are the result of infection and the remaining half are due to accidents, such as hemor-

rhage, toxemia, and heart failure. Without doubt most of the deaths that are due to infection can be prevented by cleanliness, and at least 50 per cent of the accidental deaths are avoidable. It is also conceded that the majority of maternal injuries may be avoided and the seriousness of the other injuries may be considerably lessened by better obstetrics.

Intelligent persons have always been curious to know the reason for intrauterine life. They have tried in vain to learn the reason why God made the propagation of human beings so hazardous and such a struggle, when other methods of reproduction, such as are seen in the lower forms, are much less repulsive and less injurious to the female. Both medical and lay literature are filled with theories, but no one has as yet definitely discovered the secret. It is noticeable, however, that as any of the lower orders of life become more highly specialized, their manner of reproduction becomes more complex and more difficult. It seems that nature has a peculiar way of accomplishing things, in a manner suitable to herself, without revealing the secret. Some organisms begin life one way and others another, but fundamentally they begin much the same. In the early forms of life, as we have pointed out in a previous chapter, new individuals are not developed within the mother, but are simply a division of the parent cell into two new individuals. In the higher forms of life, reproduction is relegated to special germinal cells (ova), which are set apart for this purpose within the body of the female. These ova divide in a similar manner to the lower forms, but instead of producing myriads of separate cells, they combine to produce but one individual. In the lower forms there is an extravagant waste of life, but in the more complex forms nature has been forced to be more economical. She has endowed the highest forms of life (mammals) with reproductive organs, which incubate and protect the young within their bodies until the new individual is able to cope with the elements and forces of nature. The maternal instinct is nothing more or less than a protective in-

fluence extended into later life. In other words, in the higher forms of animal life, nature has surrounded the new life with the best possible means of protection before birth, and at the same time has stamped within the mind of the maternal parent a protecting instinct to shield and care for her offspring until it is better able to lead an independent existence.

In the human race nature has seen fit to develop the child within the uterus for ten lunar months, or to a point where it will best survive. Further development would endanger its life or seriously injure the mother at birth. We do not know by what process the maternal organism is informed when this stage of maturity has arrived, but we do know from experience that nature arrives at this point with more or less accuracy.

CAUSE OF LABORS.—Numerous theories have been offered to explain the cause of labor, but as yet no definite explanation has been given. In all probability it has some close relationship with the internal secretory organs, particularly the ovaries, because labor usually happens at what would be the beginning of the tenth menstrual period. Further proof of the relationship that exists between labor and the ductless glands is seen in the fact that extracts made from the pituitary gland increase the force and activity of uterine contractions, once the patient has begun labor.

Evidently there are other factors that influence the onset of labor. Intrauterine gestation is somewhat of a ripening process, in that the child's attachment to the mother is gradually loosened as the time for birth approaches. This influence is demonstrated in cases near the end of pregnancy, where labor follows some unusual exertion or mental upset. It is quite comparable to the ripening of fruit. As the fruit matures the stem becomes less firmly attached to the twig, and if a gentle breeze moves the branches, the fruit falls to the ground. Many doctors take advantage of this ripening process to induce labor near term. They

give castor oil and quinine to initiate contractions of the uterus and extracts of the pituitary gland to enforce their strength until rhythmical contractions have been established.

In addition to the above methods of inducing labor there are mechanical ways of bringing it about. The best way to accomplish this is to irritate artificially the mouth of the uterus (cervix), either by separating the membranes from the cervix by the examining finger or by the introduction of catheters or hydrostatic bags which stimulate the dilating mechanism of nature and incidentally dilate the cervix by actual force. Rupture of the membranes (bag of water) is another means of stimulating contractions, by allowing the head of the child to act as a mechanical dilating wedge.

WHAT IS LABOR? — Labor is the process by which the uterus is emptied of all of the fetal contents, namely, the delivery of the child and the expulsion of the placenta and membranes (afterbirth). As far back in history as we have any record, childbirth has been associated with the expenditure of energy, or "strained effort," which is precisely the meaning of the word "labor." The delivery of the child is in reality a physical struggle and comes about as the result of hard work on the part of the mother. The child plays no active part in the delivery.

In the chapter on the "Signs of Pregnancy" there was mentioned painless intermittent contractions of the uterus, the so-called "Braxton-Hicks" sign. This peculiar symptom was described as occurring throughout pregnancy, but to be more precise it occurs throughout the reproductive life of the individual. The pains of labor are nothing more or less than an exaggeration of these contractions. The ability of the uterus to perform these peculiar rhythmic contractions is by no means limited to that organ, but is a characteristic of all hollow viscera that contain involuntary muscle tissue. A similar wave-like action was also previously mentioned in relation to the peristaltic movements of

the Fallopian tubes, which transport the ova into the uterus. Another example of this action is better illustrated by the rhythmic action of the intestinal tract. It is commonly observed that when the intestine is empty an imperceptible peristaltic movement takes place, but as the bowel becomes filled with food this action becomes more intense. Now, if some obstruction impedes the onward movement of the intestinal contents, colic and severe pain result. The same is true of childbirth. The enlarged uterus, in its efforts to expel the baby, forces the child against the resisting cervix, which in turn impedes its descent into the pelvis until the cervix is fully dilated. The muscular contractions continue with increasing force and frequency until this is accomplished and the uterus is emptied. When the uterus becomes empty all pain ceases.

From the above description it should be clear that the pain of labor is the result of these forceful contractions of the uterus. The amount and the severity of the pain, therefore, depend for the most part on the character and duration of the muscular contractions in overcoming the resistance offered by the cervix and birth canal.

Of course, other factors enter into the causation of pain, such as sensitiveness of the individual to any sort of pain. It is not uncommon to see one individual withstand intense pain with fortitude and another give way at the mere suggestion of pain.

SEVERITY OF LABOR.—It is not always possible to foretell from a precursory examination or from the nervous temperament of the individual whether she will have a severe or easy delivery. As a matter of fact, the amount of suffering depends mostly upon the length of labor and the vigor and vitality of the patient. In other words, a long, tedious labor will exhaust the nerve strength of the most courageous woman and cause her to suffer intensely near the end. It is for this reason that we occasionally see a highly nervous individual have a short, easy time,

while, on the other hand, a placid unemotional woman may have a long-drawn-out, painful labor, accompanied by nervous exhaustion. As a rule, other factors being equal, the more "highstrung" the individual, the more she will suffer during labor.

THE CLINICAL COURSE OF LABOR. — The clinical course of labor depends upon several factors, particularly on the amount of time and effort necessary for dilation of the cervix. First pregnancies are usually more painful for this reason. The length and the severity of labor are, therefore, more or less dependent upon the amount of preliminary dilation of the cervix before true labor pains are actually felt.

Near the end of pregnancy there is usually a painless thinning out and opening up of the cervix, accompanied by a general settling of the presenting part into the pelvis. During this time there are intervals, varying from a few minutes to hours, when indefinite or transient pains, similar to labor pains, are felt. If the palm of the hand is gently placed upon the abdomen, the uterus will be felt to contract slowly, harden gradually, and then relax. These preliminary contractions soften and prepare the cervix for a more easy and rapid dilation later. They are very probably ineffectual attempts by mother nature to begin regular, forceful contractions, but for some reason or other the pregnancy is not quite ripe. At any rate these painless, ineffectual, intermittent contractions, which have become stronger and more forceful near the end of pregnancy, occasionally obliterate and dilate the cervix so completely that the baby is born with practically no warning and very little pain. Such labors are commonly spoken of as *precipitate labors*. They are usually short and easy, but often embarrassing. In addition to these premonitory symptoms that occur during the last two or three weeks of pregnancy, there are other signs that foretell that labor is near at hand. About twenty-four hours before actual labor pains are felt there is a slight swelling of the genital parts and a discharge of mucus,

which may be tinged with blood. An internal examination at this time will reveal that the mouth of the uterus has already begun to open in preparation for the descent of the child. The change from this prodromal stage into actual labor is a gradual process.

True labor is said to have begun when the uterine contractions become painful to the patient, when they occur at regular intervals, and are effective in obliterating the cervix. When the time for true labor arrives, the preliminary discomforts merge into definite contractions which occur with more or less regularity. At first they are hardly perceptible, last only a few seconds, and are fifteen or twenty minutes apart. They are usually associated with backache and frequently confused with intestinal colic. As time goes on they become more severe, more frequent, more regular, and lower in the pelvis. During a contraction the uterus

FIGURE 21. *Diagram illustrating obliteration or dilation of the cervix during labor. The cervix is pulled open rather than forced open.*

may be felt to harden and grow smaller as the pain gradually increases in intensity. At the height of the contraction the pain rather suddenly ceases and the uterus slowly relaxes, so that during the interval between contractions the patient is free from pain.

Obliteration or dilation of the cervix is brought about in two ways (Figure 21). There is first a gradual softening and thinning out of the long nipplelike cervix, followed by a gradual opening and disappearance of the edge upward over the head of the descending child. This dilation is brought about by the rhythmic contractions of the muscular fibers of the upper part of the uterus, which draw the lips of the cervix farther and farther apart. As the uterus contracts it squeezes upon the water which surrounds the baby and compresses the membranous covering downward through the cervix as a dilating wedge. When the cervix is about fully dilated, the membranes rupture during one of the contractions. As a rule, after the membranes rupture the contractions become more pronounced and labor quickens.

It sometimes happens that the "bag of waters" ruptures before labor pains have been felt. Such labors are commonly called "dry labors" and are usually more painful because of the lack of preliminary dilation. Early rupture of the membranes initiates painful contractions and hastens, rather than retards, labor. Because the uterine contractions that draw the cervix out of the way are more numerous and harsh, and because the patient is more nervous, dry labors are regarded as more severe. For the same reason, when labor is artificially induced, the patient complains more bitterly and suffers more intensely.

SUMMARY OF SIGNS AND SYMPTOMS OF BEGINNING LABOR.—No hard and fast rule can be laid down by which the pregnant woman can tell definitely that labor is imminent or has begun. However, the more important symptoms may be summed up as follows:

1. About one or two weeks before labor begins, the uterus settles forward and downward into the brim of the pelvis. This is technically known as "lightening" and is a premonitory, but not an actual, sign.

2. Definite colicky pains will occur at regular intervals, from five to ten minutes apart, and last for about one minute. These pains are accompanied by hardening of the abdomen in the region of the uterus. Occasionally these pains subside, giving rise to what is commonly known as a "false alarm."

3. There is often an increased mucous discharge, sometimes tinged with blood, and often spoken of as the "show." This is an indication that the cervix is being dilated and that any collection of fluid outside the membranes may escape at this time.

4. There is frequently a sudden gush of amniotic fluid (rupture of the "bag of waters"), which indicates that the cervix is more or less completely dilated.

Labor Naturally Divides Itself Into Three Stages.—The first stage is consumed in the dilation of the cervix, or opening of the mouth of the womb, so that the uterus can expel its contents. This is the longest and most tedious stage of labor. The second stage is occupied in the passage of the child through the birth canal. It therefore begins where the first stage leaves off and ends with the birth of the child. This is the most painful stage, rarely lasting more than two hours. The third stage is concerned with the separation of the placenta (afterbirth), and the emptying of the uterus. This is the shortest stage and is usually completed within twenty or thirty minutes. A more complete description follows:

First Stage, or Stage of Dilation.—About 280 days after the beginning of the last menstrual period, or about the time of the tenth missed period, the uterus becomes more irritable than usual and the patient begins to feel rhythmical, cramplike pains very

similar to the discomforts of menstruation, and often mistaken for stomachache or intestinal colic. The patient most often complains of backache and if alert she will notice that coincident with the backache the abdomen will become hard. When first perceptible the contractions are fifteen to twenty minutes apart, and last for only a few seconds. Between the contractions the abdomen relaxes, and if the patient will observe closely she will find herself free from pain.

If the patient will make up her mind at this stage to relax between pains and not to become apprehensive and nervous, she will be rewarded with an easier and better delivery. Relatives and friends will do well to instill confidence into the patient, rather than to sympathize with her. It has been demonstrated on innumerable occasions that a confused, anxious environment will easily be reflected in the mind of the prospective mother. In this way, misdirected sympathy will create a great amount of unnecessary apprehension in the woman in labor for the first time. A confident, composed mental state is the best preparation for the ordeal that she is about to undergo.

As time goes on, the contractions become more frequent and more sustained. The pains in the back are gradually transferred to the front and become more and more intense. Each contraction of the uterus assists in dilating the cervix, and any secretions that have accumulated outside the membranes are gradually discharged. It sometimes happens that large accumulations of fluid amounting to a pint or more collect between the membranes and the uterine wall so that, when the mouth of the uterus opens, the fluid gushes out and is mistaken for the rupture of the "bag of waters." Near the end of the first stage the vaginal discharge becomes tinged with blood as a result of injury to the tiny vessels in the edge of the cervix. The rupture of these vessels is the result of cervical dilation, and when this "show" is noticed, the dilation is more or less complete. Many nurses follow the progress of labor by the character of this discharge. Up to this time the

patient will be fairly comfortable between pains and will do well to be up and about.

Near the end of the first stage there is often a sudden gush of clear fluid (amniotic), which indicates that the "bag of waters" has ruptured and the dilation of the cervix is near completion. From this time on there will be a slight discharge of this fluid with each pain.

The first stage takes up about nine-tenths of the whole labor. It is the most tedious and discouraging part because the patient so often feels that she is not accomplishing anything. She often loses her pluck and cries out for help. A word of encouragement at this time is of great assistance in carrying the patient past this trying stage.

The amount of progress the patient is making may be estimated in various ways. The most characteristic sign is that the pains become more frequent and more intense as labor progresses. However, the most reliable means of determining this progress is by vaginal examination. The examining finger actually feels the amount of dilation of the cervix, the position of the child's head, and the distance it has descended into the pelvis. Although this is the best means of estimating the amount of progress, it is by no means without danger. If the proper precautions are not scrupulously adhered to, the introduction of infective material, with resulting childbed fever, is very likely.

It is for this reason that the physician scrubs his hands thoroughly and covers them with gloves that have been previously sterilized. It is for the same reason that the nurse or doctor cleanses the genital parts before an examination is made. These simple procedures, as pointed out in a previous chapter, have reduced the maternal mortality from an appalling rate to an almost negligible quantity; and yet it is not uncommon for some women to frown upon such cleanliness as unnecessary and criticize the doctor for not making more frequent examinations. Occasionally doctors examine the cervix and determine the position

and descent of the head of the baby by rectal touch. Although the results of such an examination are less reliable, there is less likelihood of introducing infective material into the birth canal.

There are other methods of ascertaining the progress of labor to which the physician has access. A careful examination of the patient's abdomen will reveal the position of the child, and the amount of descent of the head into the pelvis. In an indirect way it gives a rough estimate of the dilation of the cervix and the molding of the child's head to the birth canal.

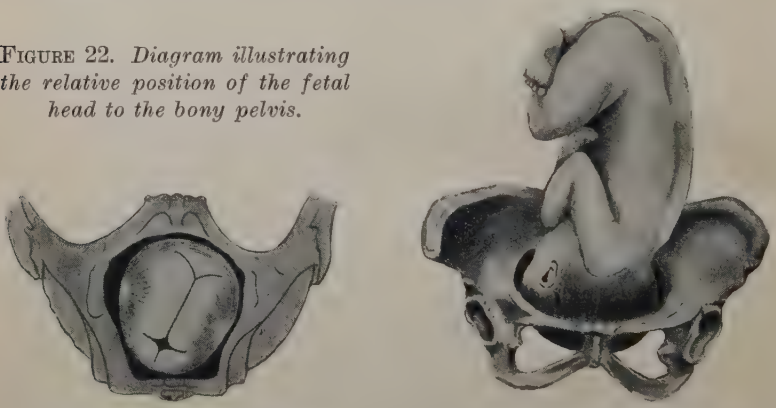


FIGURE 22. *Diagram illustrating the relative position of the fetal head to the bony pelvis.*

In order to facilitate birth, the child's head is forced by the natural process into a certain posture or position (Figure 22). It is flexed forward so that the chin rests snugly against the chest and its long axis will parallel the long axis of the birth canal. The smallest diameters of the child's head are best adapted to the constrictions of the bony pelvis. This relationship of the child's head to the mother's pelvis determines the most advantageous position for birth.

During the descent of the head into the pelvis it also undergoes a gradual alteration in shape, so that the smallest diameters are made smaller by elongating the longer diameters. This process is called molding, and is due to the fact that the bones of the

child's head are separate and overlap one another during its passage through the rigid bony pelvis of the mother. The harder and longer the labor, the greater the elongation or distortion of the head. The long duration of the first stage gives the woman who is going to the hospital ample time to get there, and the woman who expects to be confined at home plenty of time to make all preliminary arrangements. She should not yield to fear, worry, or apprehension, but keep herself in a cheerful frame of mind. In order to accomplish this it is not necessary to have a whole houseful of friends and relatives. One calm person can do all that is necessary. The woman who allows herself to become excited and apprehensive has a much more painful time than the woman who remains calm and undisturbed. For the sake of her own comfort, all disturbing and exciting influences, particularly her sympathizing friends and relatives, should be excluded at the beginning.

When the first pains are felt, the woman who stays at home should notify the doctor and nurse that labor has begun and put herself and her house in order. The bed should be made and a kettle of water should be placed on the stove to boil. She should then be given a warm soapsuds enema and a cleansing shower or sponge bath. Her hair should be combed and braided and clean night clothes put on.

During this time the patient will do well to remain up, for she will be happier and more contented if she can keep herself occupied. Her food should be limited to light nourishment such as soups, broths, milk, cocoa, and toast. Between pains she may rest by lying down or may occupy herself in some way to divert her mind. During the pains she will find comfort in leaning over the foot of the bed or the back of a chair. Straining or bearing down is unnecessary at this time. It does not help the progress of labor and may exhaust the patient for the second stage when additional force will be required.

Second Stage, or Expulsion of the Child.—When the intervals between the contractions become two or three minutes apart and the patient has a persistent involuntary inclination to strain downward, she can be very sure that dilation of the cervix is complete and that the birth of the child is near. This is the beginning of the second stage of labor, and the moment that the head passes through the cervix the patient will make it known by complaining more bitterly than before. For a short time following this the pain may be less acute, but is more constant, and the patient feels like making an effort to push the baby out. She should now be put to bed and the doctor notified that the second stage is at hand. The pains will soon become much stronger and the intervals between them shortened until they are almost continuous. With each pain the patient makes an effort to "bear down" and frequently complains that her bowels are going to move, because of the pressure on the rectum. With each expulsive effort the baby's head is forced downward into the pelvis. When the head is well down the parts about the opening of the vagina begin to bulge and separate with each contraction.

Active coöperation of the patient with each pain during the second stage of labor will materially hasten delivery. In order to get the most benefit out of each contraction, the patient should take a deep breath at the beginning of the pain and hold it while she makes a vigorous effort to strain downward and expel the baby. At the same time the knees should be drawn upward to open the outlet of the pelvis and the back should be curved forward to give the abdominal muscles a better opportunity to act. The patient will feel more secure and better prepared to "push" if the hands are allowed to grasp some rigid object. As soon as the pain is over the patient should relax and conserve her strength for the next contraction.

As the head slowly passes down the birth canal it presses upon the structures contained within the pelvis. The urine passes involuntarily and the contents of the rectum are forced out. Pres-

sure on the large nerve trunks as they emerge from the spinal column may cause pain down the thighs and cramping of the muscles of the legs. But these will disappear as soon as labor is ended.

By a series of expulsive efforts the crown of the child's head is forced into sight. At first it is seen only with the pain, but as time goes on more and more of the head appears until the soft elastic tissue of the perineum is released. At first the crown of the child's head is seen just beneath the pubis, but later it is pushed outward until the nape of the neck fits under the pubic bone. From this time onward the neck remains stationary and the head rotates upward so that the forehead, eyes, nose, mouth, and finally the chin, successively pass over the perineum. After the birth of the head the rest of the child's body, which is smaller in circumference, is easily forced out. Occasionally it is necessary to use force in extracting the shoulders in order to expedite matters.

The second stage is very much shorter than the first. Its length and severity depend upon the relationship of the child's head to the size and shape of the birth canal. In other words, the severity of the second stage is directly proportionate to the amount of resistance offered to the descending head. In first deliveries the child's head encounters a more obstinate resistance, the tissues are more firm and inelastic and frequently have to be ruptured or severed before the head can be passed. In subsequent deliveries the birth canal is more or less relaxed, and therefore less resistance is encountered.

Third Stage, or Stage of Delivery of the "Afterbirth."—The second stage ends with the delivery of the child and the expulsion of the remaining amniotic fluid. There is still the afterbirth, or placenta and membranes, to be delivered. This is spoken of as the third stage, or the delivery of the afterbirth. It must not be forgotten that the baby is still attached to the placenta

by the umbilical cord, which has to be severed before the baby is entirely free from the mother.

Following the delivery of the child, the doctor immediately holds the baby up by the feet to drain from the mouth any mucus or fluid that might be inspirated into the lungs. If the child has no difficulty in breathing, it is laid upon the foot of the bed or upon the mother's abdomen. The eyelids are then cleansed of secretions and a drop of some antiseptic solution is instilled into the eyes to prevent infection and possible blindness. In the hospital an identification tag is attached to the baby's wrist and a similar one to the mother's wrist. The umbilical cord is now tied securely to prevent bleeding and then severed. The baby is now free from the mother and is handed to a nurse for subsequent care. Other means of identification are placed on the child to avoid mistakes before it leaves the delivery room.

During this time there is a cessation of pain and the patient either falls asleep for a short while or rests quietly unconcerned. Throughout this period the doctor has kept a close watch on the patient and feels the uterus from time to time to prevent any undue relaxation and possible hemorrhage. As long as the uterus remains hard there is little danger of hemorrhage. Excessive loss of blood lowers the vitality of the patient and invites infection and childbed fever. If the uterus remains firm and no hemorrhage is present, the doctor will carefully examine the birth canal for tears that may have occurred. If this examination is not done at this time it is attended to immediately after the delivery of the placenta.

Every tear, except simple abrasions of the mucous lining of the birth canal, should be repaired. It is safe to say that the large majority of women are torn more or less in their first delivery and a good percentage are torn during subsequent deliveries. If the patient stops to consider that the birth canal is forcibly enlarged from a small, narrow canal up to an opening large enough for the passage of the child's head, she will certainly not blame

the doctor for her injury. Beware of the physician who does not have tears, for he either does not know how to discover them or does not look close enough to find them. The more careful the physician the more apt he will be to discover these lacerations and put in the necessary stitches. Such a physician is safeguarding the future health of his patient.

During this interval the uterus has been contracting and relaxing as usual in an effort to loosen the placenta and to close off the bleeding sinuses. A certain amount of bleeding always occurs at the time when the placenta is being detached. After fifteen or twenty minutes the placenta becomes wholly unattached and comes away during one of the contractions, or is forcibly pushed out by the doctor (Figure 23). The patient is now free of all the products of gestation and the uterus proceeds to return to normal.

Following the delivery of the child, the average patient loses from a half pint to a pint of blood. As a rule, the less blood the patient loses the more rapid and more sure the convalescence. Some women erroneously believe that bleeding is a healthy sign and that the patient cleanses her body by the washing out with blood. It is the duty of every physician, so far as possible, to prevent the loss of blood. This is accomplished by stimulating natural contractions of the uterus, either by massage of the uterus itself, or by the injection of ergot or pituitary extract. Other means of preventing hemorrhage are available to the physicians, but are too technical to describe at this time.

DURATION OF LABOR.—Most women look upon labor as an ordeal through which they must pass. Naturally they are desirous of knowing the length of labor, or, to be more precise, they want to know how long and how much they will suffer. Technically, labor begins with dilation of the cervix, but suffering does not necessarily begin at this time, because, as pointed out before, a certain amount of dilation of the cervix may be present two,

three, or even four weeks before the patient is actually conscious of pain.

The duration and the severity of pain, therefore, depend upon a number of factors, but particularly upon the length of time and the amount of force necessary to bring about sufficient dilation of the cervix and birth canal to allow the child to pass. For this reason the duration and the severity of pain vary in different individuals, and also in the same individual in different pregnancies.

As a rule first pregnancies are longer and more painful than subsequent deliveries, but this is by no means a hard and fast rule. Occasionally we are agreeably surprised by an easy, short, first labor; and at other times provoked by an unusually hard, exhaustive, subsequent birth. The average length of time, estimated from a large series of cases, shows that the patient, pregnant for the first time, suffers about six hours longer than she does at subsequent pregnancies. To predict with accuracy the length of time that any particular individual will suffer is therefore impossible.

It has been shown that the average woman, pregnant for the first time, is conscious of pain for from sixteen to eighteen hours; actual suffering is much less than this, usually not more than half this time. It has also been observed that suffering is more intense and more prolonged when the first child is born late in life, or in those cases where labor is induced by artificial means. Again, patients who are highly sensitive to pain are apt to suffer more than those who are less sensitive. Also patients who become discouraged and exhausted feel the effects of pain more intensely than other patients.

OCCURRENCE OF LABOR.—There seems to be a prevalent notion among women that most births occur at night. This is purely a supposition, as any large series of birth records will show. Examination of the birth reports of any city will prove that there are about an equal number of children born during

any hour, day or night, winter or summer. This erroneous impression is more than likely due to the fact that the majority of people are more impressed by unusual events that occur during the silence of the night.

WHAT TO DO IN THE CASE OF AN EMERGENCY.—There seems to be a constant fear among pregnant women that their baby will be born before the doctor or nurse arrives. It is only in rare instances that the patient does not have sufficient time to attend to the essentials of delivery before the child is born. The very fact that the baby can be born without assistance should be proof enough that everything is more or less satisfactory for birth. It is the long, tedious, difficult labors wherein lies the danger of infection and lowered vitality. It is to prevent possible infection that everything should be made ready at least one month before the estimated time of delivery, so that, if an emergency does arise, the patient will not be wholly unprepared.

Precipitate deliveries, or rapid deliveries that occur without warning, are extremely rare. They always occur in women who have previously borne children, and in those who are venturesome and more or less indifferent to embarrassing situations. "Accidents have a preference for careless and thoughtless individuals." Precipitate deliveries seldom occur in first pregnancies or in women who are watchful for the preliminary signs of impending labor.

It sometimes happens, particularly in country practice, that the doctor and nurse are delayed in reaching the patient; or again, the patient may reside in some remote district where doctors, nurses, or midwives are not available. For this reason a detailed description of the management of such a case will be outlined in order that a neighbor or relative may render assistance until better help may be procured. Even though the doctor is not actually present when the delivery of the child takes place, his services are still more or less indispensable. He is able to

deliver the placenta with less bleeding and to prevent undue hemorrhage; to sew up tears of the perineum; and most of all to prevent contamination and childbed fever. The more serious complications are the result, not of doing too little, but of doing too much.

The importance of cleanliness in the prevention of childbed fever has been stressed in a previous chapter. For this reason, as soon as the signs of impending labor occur, the patient, the room, the bed, the clothing, the hands of those who assist in delivery, in fact, everything that comes in contact with the patient, must be made as free from bacterial contamination as possible.

The patient will do well to remain up until the pains are coming about four or five minutes apart. If this happens to be her first delivery she may stay up until the pains are occurring at shorter intervals. When she shows signs of impending delivery, she should immediately go to bed and a delivery pad should be placed under the hips. The assistant must first thoroughly scrub her hands with soap and water and then prepare the patient for delivery. The genitals should be cleansed well with soap and water and rinsed off with some antiseptic solution, such as a teaspoonful of lysol in a quart of sterile water. Sterile sheets should be placed under and over the patient and sterile stockings drawn over the feet to above the knees.

The attendant should then sit by the patient until the child's head is born. In other words, let nature take her course and do not interfere. It is best for the patient not to push the baby out too rapidly, in order to prevent as much laceration as possible.

After the head is born, let the patient deliver the rest of the child if possible. If it is too slow in coming she may assist herself by pushing downward upon the uterus. If the baby does not come with the next pain or the child's face becomes dark blue, the attendant may assist the delivery by gently pulling upon the head. As soon as the baby is born it should be held up by the feet to

allow mucus to run out of the mouth. It should then be placed upon the bed, the eyelids wiped off with moist cotton, and a drop of 1 per cent silver nitrate, or 10 per cent argyrol, instilled into the eyes. If the child does not cry immediately, do not become alarmed and start punishing it. Make sure that the throat is clear and then gently lower the head and forcibly breath into the child's mouth. This should be continued as long as the child's heart continues to beat. Sooner or later it will begin to breathe of its own volition, if it has not been injured in birth or by some too energetic attendant.

When the child begins to breathe, the attendant should tie the cord securely, about one inch from the navel. Another ligature should then be tied about two inches from the first ligature and the cord severed between the two ties by a pair of scissors that have been previously boiled. The stump of the cord is then covered by a piece of sterile gauze and the child removed to a place of safety.

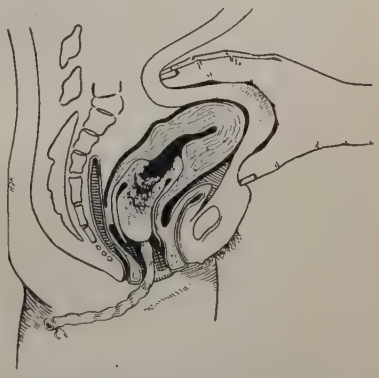


FIGURE 23. *Diagram illustrating manual expression of the placenta.*

If the attendant has done this much, and no more, she has done well and may calmly sit by and wait for nature or the doctor to do the rest, provided there is no alarming hemorrhage. In most cases nature will deliver the placenta intact, before thirty minutes have elapsed. If the afterbirth is slow in coming, she should not become alarmed and pull upon the cord, but wait patiently. If there is an excessive amount of bleeding it must be checked without delay. An attempt should be made to express the placenta and stimulate the uterus to contract and close off the bleeding sinuses within its walls (Figure 23). In order to accom-

plish this the attendant feels for the relaxed uterus through the abdominal wall and gently massages it until it becomes firm. At the height of the contraction the placenta will usually come away without any difficulty. At the same time the foot of the bed should be raised and the patient instructed to remain quiet. Under no circumstances should she attempt to remove the afterbirth by inserting the fingers in the vagina.

If the afterbirth has come away it should be saved for examination by the doctor. The genitals should then be carefully cleansed and a sanitary pad and abdominal binders put on. The soiled articles may now be removed and clean sheets spread above and below the patient.

Frequently the mother suffers from a nervous chill following childbirth. A warm drink or a hot-water bottle to the feet is all that is needed. If left alone the patient will soon fall into restful slumber.

CHAPTER XIV

THE RELIEF OF SUFFERING

I. *The Administration of Hypnotics, Analgesics, and Anesthetics*

The mind of the world has never been completely at rest in regard to the suffering of women during childbirth. The Bible states that in the beginning the Lord caused a deep sleep to come upon Adam for the removal of a rib from which He made woman. Shortly after He said unto Eve, "I will greatly multiply thy sorrow and thy conception; in sorrow thou shalt bring forth children." From this time onward there seems to be a divergence of opinion, relative to the relief of this suffering.

As far back as we have any record, women have suffered the pangs of childbirth and have sought relief in some form or other. It is said that Apollo was born while his mother was under the influence of hypnotic suggestion, and that the ancients often administered a narcotic potion to lessen the agony of labor. Alcohol in some form or other and the fumes of opium have long been known to numb the sensibilities and have been freely used for this purpose. But on the other hand, only four hundred years ago, in Scotland, a mother was accused by the bishops of allowing a midwife to lessen the terrors of childbirth. She was told that "God wants mothers to suffer," and both she and the midwife were adjudged as heretics and suffered the penalty of death. There are still many who protest against the relief of suffering at this time.

During the nineteenth century new methods were devised to abolish pain, so that at the present time some form of relief is given. In 1842, Dr. Long, a country practitioner of Georgia, discovered the anesthetic properties of ether, and about the same time, although entirely independent of Dr. Long's discovery, Dr. Wells of Hartford (1844) and Dr. Morton of Boston (1846) applied the same chemical for the relief of pain in the extraction of

teeth. In a short time ether was administered to a surgical patient in the old Massachusetts General Hospital by Dr. Morton, and Oliver Wendell Holmes, at this time, proposed the terms anesthesia and anesthetic, which have subsequently been retained (Figure 24). In January, 1847, Simpson of Edinburgh first administered ether to lessen the agony of childbirth, but, because of some of the undesirable effects of ether, he searched for a more desirable substance, and near the end of the same year discovered the anesthetic properties of chloroform. A storm of protest, as is usually the custom with any new departure, broke loose, and physicians, clergymen, and laymen joined hands in opposing the relief of pain during delivery. The physician condemned it as dangerous, the clergyman said it was against the wishes and desires of God, and the layman insisted that it lessened the mother's love for the child.

In 1853, when Queen Victoria was about to give birth to her seventh child, she was warned by her bishops against the use of anesthesia, and is reported to have said something to the effect that, when the bishops give birth to children they will understand the desire for the relief of pain. Chloroform was again administered to the Queen in 1857. A few whiffs were given with each

FIGURE 24. *Massachusetts General Hospital, where Morton demonstrated anesthesia, 1846.*

pain, but not enough inhaled to produce unconsciousness. This type of anesthesia (analgesia) became known as "Anesthesia a La Reine," or "Obstetrical Anesthesia," in contrast to surgical or deep anesthesia. This is one of many examples where royal sanction has proved to be a stronger argument than reason. It may be of interest to know that the wife of the poet, Henry Wadsworth Longfellow, was the first woman in America to receive chloroform during childbirth.

In 1878 nitrous oxide gas, which was beginning to be employed in dentistry, was applied with considerable success, and in 1902 morphine and scopolamine, or "twilight sleep" as it is popularly termed, were given to produce seminarcosis. During the last few years ether-oil-anesthesia has been revived and ethylene gas is being used as a substitute for nitrous oxide.

The reason for labor pains has never been fully understood. It is notably true that all animals suffer during the birth of their young. In some of the insects the mother's life is invariably sacrificed. The only scientific explanation for the association of pain with birth is that it forewarns the prospective mother that birth is near and gives her time to protect her frail progeny. Pain does not, as is commonly supposed, intensify the mother's admiration and love for her child, because children born by Caesarean section, where all pain is abolished, are loved and protected as are other children.

The majority of medical men believe that any woman has the right to demand relief from the pain of labor, as long as the drug or anesthetic does not injure her future health or endanger the life of her child. If this can be accomplished by the administration of some substance, which, even though it does not entirely abolish the pain, will at least make labor less of an ordeal, its use is fully justified.

The best preparation for the relief of suffering in childbirth, beyond doubt, is for the patient to assume a hopeful and confident attitude before labor begins and maintain it until the end. Many

women lose their composure and become unreasonable and uncontrollable as soon as labor starts, because of the element of fear that has been instilled into them from childhood. The physician can do very much to mitigate the suffering of childbirth if he take the trouble to gain the confidence of the patient and set her mind at ease.

The unfortunate part about anesthesia in childbirth is the fact that any general anesthetic, potent enough to eliminate pain, necessarily interferes with the uterine contractions or decreases their expulsive force. It is because of this difficulty that deep anesthesia that will relieve all pain is inapplicable to childbirth. It may be inferred from this that, in order to have an ideal anesthetic, the drug or chemical must necessarily relieve the pain, and not interfere with the progress of labor or be injurious to mother and babe. In addition it must be applicable to 100 per cent of the cases.

It has been found that between consciousness and unconsciousness there is a semiconscious state where pain is blunted, if not actually abolished, and yet the patient will react to suggestion. This stage of anesthesia (analgesia) has been designated as "obstetrical anesthesia" in contradistinction to "surgical anesthesia," where pain is entirely abolished and the muscles relaxed. It is to obtain this end that soporifics and anesthetics are given.

Ether will help to accomplish this if given intelligently in the second stage of labor when the pains are more or less intense. If given too early or too fast it will diminish the force of the uterine contractions, prolong labor, and increase the amount of hemorrhage following birth. If given properly toward the end of labor, it will diminish the pain and encourage the patient to bear down. In some cases ether actually stimulates the uterine contractions. The best results are obtained by pouring a teaspoonful of ether on the mask and instructing the patient to inhale deeply the moment that she feels the pain or contraction to start, or better,

the moment that the nurse feels the uterus begin to harden. When given properly the patient becomes semiconscious at the height of the pain, and if properly instructed will bear down when told to do so. Just before the head is about to be born, and when suffering is most intense, the patient is given a little more ether than usual and soon lapses into unconsciousness. This frees the patient of all pain, causes the muscles to relax, and allows the obstetrician to deliver the child with less injury to the perineum.

Chloroform is administered in the same manner as ether. It is more pleasant to take and the patient reacts more readily. She also recovers more quickly and feels the bad effects less. The great objection to chloroform is that it has a tendency to slow the progress of labor.

Nitrous Oxide has been used by dentists to abolish pain for more than fifty years. It has long been used in obstetrics. It is quicker in its action than ether or chloroform and requires more skill in its administration. Of late years it has been given in combination with oxygen, which decreases its bad effects. In some respects nitrous oxide is superior to ether or chloroform, but it will never supplant them, as it requires a cumbersome machine, which is often out of repair and difficult to transport, and a trained anesthetist to give it properly.

Twilight Sleep.—About the year 1900 a mixture of *morphine* and *scopolamine* was introduced in Germany to relieve the suffering of childbirth. The morphine was given to deaden the pain, and the scopolamine, which is a form of hyoscine, was added to produce amnesia or forgetfulness. The reason for employing this combination was to produce an insensible state midway between consciousness and unconsciousness; a state of seminarcosis, which later become known as "twilight sleep." In an ideal case the patient would lapse into a drowsy state, wherein she would drop asleep between pains and be partially aroused and open to sug-

gestion when contractions were at their height. Although the patient would react rationally to commands to bear down with each pain, when delivery was accomplished she would have no knowledge of suffering during birth. This method of delivery was given considerable publicity in the popular magazines, so that a great many women demanded that they be given it during the birth of their children. It was soon found that different patients reacted differently to the injection of these drugs. Instead of producing analgesia and amnesia, they occasionally produced a state of excitement, in which the patient could not be properly controlled. In addition to this the baby occasionally failed to breathe properly after birth. Because of the number of unfortunate results that followed its indiscriminate use, the method soon fell into disrepute.

Of late years, however, it has been revived in a modified form, and in skilled hands is practically free from danger and actually prevents nervous exhaustion in hypersensitive or apprehensive individuals. It is not given to replace ether or gas anesthesia, but given in the earlier stages of labor to abolish memory and dull pain where other forms of anesthesia are unsuitable. In conclusion it may be said that the modified form of "twilight sleep," given in selected cases, by skilled hands, and in a properly equipped hospital, forms a perfect first stage anesthetic in that it helps to prevent physical and nervous exhaustion and leaves the mother in a more cheerful frame of mind for future pregnancies.

Within the last few years attempts have been made to produce analgesia by the introduction into the bowel of ether-in-oil, accompanied by the hypodermic injection of other drugs, some of which help to lessen the severity of the pain, and others to stimulate contractions. This is often spoken of as *synergistic anesthesia*, or *ether-oil-rectal-anesthesia*. This method has been introduced to counteract the bad effects of prolonged anesthesia from ether and yet retain its good qualities. In selected cases it bids fair to

supplant prolonged chloroform, ether, or gas anesthesia, and in conjunction with modified morphine-scopolamine seminarcosis in the first stage, the patient may complete all the dreaded part of childbirth without being conscious of pain.

Ethylene Gas for the last two or three years has been used as a substitute for nitrous oxide gas. It is given similarly to nitrous oxide. Its chief objection is the danger of explosion if not properly insulated.

Regional and Local Anesthesia have been used in some cases with success, but have such a narrow field of application that they never will be used universally.

II. *The Relief of Suffering and Lessening of the Hazards of Childbirth, by Shortening the Length of Labor.*

As far as possible all labors should be allowed to proceed unmolested, as long as they do not become unduly prolonged and the patient does not manifest signs of physical or nervous exhaustion. Prolonged labor, which lasts for days, undermines the moral and physical strength of the patient and invites infection. To combat this, hypnotics and sedatives have to be given hypodermically to induce sleep and rest.

In some cases it is not advisable to allow the patient to go on indefinitely in the hope that nature will eventually deliver the child. If the patient is allowed to continue in labor for days, her vitality becomes lowered and the uterine contractions become feeble and eventually lose all their expulsive force. Before this happens, in suitable cases, the labor may often be brought to an end by the hypodermic injection of pituitary extract, which increases the strength of the contractions. In other cases the patient has to be anesthetized and the baby delivered by instruments or other means.

PITUITRIN. — In 1899 Compte showed that the pituitary body, which is situated at the base of the brain and is concerned in skeletal growth, and mental and genital development, becomes enlarged and more active during pregnancy. Twelve years later an extract of this gland (pituitrin) was made and injected hypodermically into a patient, whose uterine contractions had become feeble, in the hope that it would stimulate contractions and increase the expulsive force of the uterus. To the surprise of all concerned it more than fulfilled expectations. The knowledge of the remarkable properties of this extract spread rapidly throughout the country, so that in a short time physicians and midwives were giving it to all their maternity cases. Injuries to the mother and babe, sometimes amounting to real tragedies, followed its injudicious use. Consequently in a short while pituitrin fell into disrepute and was condemned by all the leading obstetricians. Like every new fad that has merit, its field of usefulness in time became limited to certain well-defined cases. When given intelligently, and in selected cases, the patients were able to deliver themselves without help. The ineffectual uterine contractions, which only annoyed and irritated so many patients, were stimulated into contractions of sufficient strength to expel the baby. In this way the number of prolonged labors and operative deliveries was markedly reduced.

Pituitrin is also valuable in stimulating contractions weakened by anesthesia. It should never be given to strengthen contractions before the mouth of the uterus is fully dilated, or in cases where there is any disproportion between the size of the child's head and the bony pelvis. In addition to the advantages mentioned above, it is of considerable value in shortening the third stage of labor and controlling post-partum hemorrhage. The intelligent use of pituitrin is undoubtedly a big step forward in the science of obstetrics.

INSTRUMENTS. — Instrumental delivery, or delivery by forceps, is probably the most common method of terminating difficult and prolonged labor. The obstetrical forceps is designed to extract the child by traction on the head (Figure 25). There are a variety of instruments on the market, which vary in size and shape, but fundamentally are the same. The Simpson Forceps is the one most widely used at present.

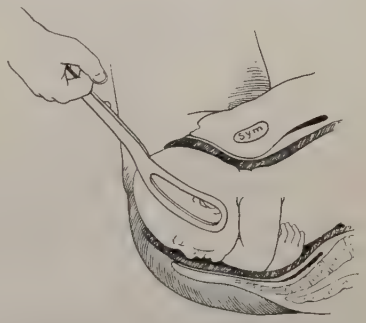


FIGURE 25. *Diagram illustrating the application of forceps.*

The invention and perfection of the instruments form an interesting and instructive chapter in the advancement of obstetrics. Ancient literature mentions the use of forceps in the extraction of the baby, but not in the same sense that they are used today. The ancient forceps was either a hook or an instrument fitted with teeth, evidently designed for the delivery of a dead child. It was simply a device for saving the life of the mother, without any regard for the baby. These instruments were crude in workmanship and clumsy to handle. Previous to their use feeble attempts were made to fasten cords and nets to the head of the child.

The invention and development of the modern instruments dates from 1569, when William Chamberlain, a practicing physician in England, claimed a new and secret method of delivery, which he alleged was neither injurious nor harmful to child or mother. He kept his new invention a secret and refused to reveal any information concerning it, except to members of his own family. Because he was able to deliver many women where other practitioners had failed, he soon gained a large following and acquired considerable money. His two sons achieved some success as obstetricians and subsequently became wealthy.

This invention remained a family secret for more than one hundred years and would, no doubt, have still been concealed if it had not been for the extravagance of a son in the third generation, who sold the secret to discharge some incurred financial obligations. In 1725 the secret forceps become more or less widely known and generally used. The defects of the original forceps soon became apparent and new instruments were devised to overcome these imperfections. The modern forceps, which is a direct descendant of the Chamberlain forceps, has without doubt saved more lives than any other surgical appliance that has ever been invented. In fairness to Chamberlain it must be admitted that he deserves credit for the invention of this indispensable instrument, but he will never receive the high esteem and respect that he rightfully deserves, because his selfishness deprived the world of rightful knowledge which might have saved thousands of lives and prevented untold misery.

The primary indication for the use of the modern forceps is to save the life of the child, but they are also used to relieve the suffering and lessen the hazards of the mother. The most common indication for their use is in those cases that show lack of progress in the descent of the head through the birth canal. In most cases of prolonged labor the head of the child is forced down to the pelvic floor, but the uterine contractions and physical efforts of the patient are not sufficient to deliver it. In such cases the use of the forceps is a simple and convenient way of completing the birth. They are also used in emergencies which imperil the life of the mother, such as hemorrhage, heart failure, kidney disease, toxemias, and recurrent infections.

There is little danger in the use of forceps, in selected cases, if they are applied properly and under strictly aseptic surroundings. The accidents that follow such operations are the result of early and improper application, and disregard for surgical cleanliness. Forceps should never be applied unless there are definite indications present which demand their use. Certain conditions

have to be fulfilled before they may be applied with success. Such technical information is only available to the physician in charge, and he alone can judge when intervention is justified. The patient or friend who urges the physician, against his better judgment, to forcibly deliver the child is committing a grave and possibly a fatal error.

Delivery by Version or Turning the Baby and Extracting It Feet Foremost.—This is a method of delivery that dates back to antiquity. Before the days of aseptics the maternal death rate practically prohibited this form of delivery, except as a procedure of last resort. Surgical cleanliness and better technic have made this means of extracting the child a safe procedure. It is the method of choice in prolonged labor, where the head of the child has not descended into the pelvis and in some cases of emergency where the child must be delivered without delay.

CAESAREAN SECTION.—By a Caesarean operation is meant the delivery of the child through the abdominal wall by a surgical procedure. It is commonly supposed that Julius Caesar was delivered by this method and hence its name. This is hardly possible because, before the days of skillful surgery, such operation were only performed on dying women or immediately after death, in hope of saving the child. It is a matter of record that Julia, the mother of Caesar, did not die, but lived several years after his birth. A better explanation is that it derived its name from *cedere,* the Latin term for "to cut," the old law requiring the removal of the unborn child before the burial of the mother.

There is no record that this operation was performed on the living woman until about the fourteenth or fifteenth century. A few daring surgeons attempted the operation, but more than half the patients operated upon died because of uncontrollable hemorrhage and subsequent infection. It was not until Sanger of

Leipzig, in 1882, began to employ sutures for the control of hemorrhage, and surgical cleanliness to prevent infection, that this operation became an operation of election.

The idea is still prevalent among some persons that the Caesarean operation is an operation of last resort. As a matter of fact it is, and should be, an operation of election, and in properly selected cases it is attended with less danger than the average abdominal operation. The most common indication for this type of operation is in the woman who has a contracted or deformed pelvis, through which the baby cannot be born with safety. In such a case it is the duty of the physician in charge to know that the operation is necessary before labor begins, because vaginal examinations or operative procedures that are likely to introduce infection into the mouth of the cervix prohibit its employment. For this reason a careful physical examination is made and measurement of the pelvis taken early in pregnancy.

Other indications for abdominal delivery are tumors that obstruct the birth canal, bad heart, kidney disease, and implantation of the placenta over the mouth of the cervix. It is seldom, if ever, employed where the child is dead, or when infection is present or likely to take place.

CHAPTER XV

CARE OF THE MOTHER AND BABY

Care of the Patient Following Delivery (Lying-in Period.)—Prenatal care was advocated and instituted to preserve the health of the pregnant woman and to prevent the onset of certain conditions that were known to cause invalidism and loss of life. For this same reason post-natal care, or treatment, is urged. It has been constantly observed that women who accept this care are amply rewarded for their time and trouble.

It is true that in cases of necessity or through ignorance women have left their beds shortly after delivery and resumed their regular household duties. Because they did not die (and, of course, no one expected them to die), these women seem to take pleasure in annoying and ridiculing the young mother who is making an earnest effort to be rational. These same women may be suffering from female complaints, which are a direct result of their own folly, but which they will not recognize as such. A study of primitive life shows that the savages had learned the benefits of rest following childbirth. They regarded the new mother as unclean and made rest a part of their religious observance. Such women were isolated and given special care for a length of time.

Persons who argue that rest in bed following childbirth is a waste of time and money, do so because of their ignorance of the anatomical processes taking place after childbirth. For nine months preceding delivery the body has undergone a tremendous physical change. Following the birth of the child there is a sudden reversion of the tissues to normal, spoken of as involution.

Immediately after delivery the uterus, which has contained both the child and afterbirth, contracts to about the size of the infant's head. This contraction prevents hemorrhage, diminishes the caliber of the uterine vessels and sinuses, and frees the uterus

from accumulation of waste material. The repeated rhythmical contractions continue and gradually reduce the size of the uterus so that in about one week it is small enough to enter the pelvis. The birth canal resumes its normal appearance, after its great distention, in less time than one would believe possible. The abdominal wall takes more time in restoration, but if proper exercises are taken but little evidence of its former distention is seen after the first month or six weeks.

The greater part of these changes take place within the first two weeks, and by the end of six weeks or two months most of the tissues have practically returned to normal. It has been proved that this restoration takes place more rapidly and efficiently if the patient avoids fatigue, conserves her strength by rest in bed for a week or two, and refrains from household duties for a month or six weeks.

Immediate Care.—Following labor the external genitals are cleansed of blood and a sterile pad is placed over the vaginal orifice to prevent infection from getting into the open wounds in the birth canal. Other parts are then washed and an abdominal binder is placed on the patient to fasten and hold the pad in place. If the binder is made to fit snug, it gives the patient a feeling of support and helps to relieve the feeling of emptiness, of which many complain. The binder is not applied, as many women suppose, to restore and preserve the figure.

As soon as possible the patient should be made comfortable and the room darkened. She now should be allowed to relax and sleep. This needed rest is most essential and should not be interrupted.

Many maternity patients, after the first twenty-four or forty-eight hours, rather enjoy a short visit from a congenial friend. They are cheered up and the stay in bed is shortened by the right sort of company. It must be constantly borne in mind that the patient is not in bed to receive callers and to enjoy the flattery of friends, but to regain her original health in the shortest

possible time. For this reason friends and relatives who annoy the patient and irritate her by their monotonous conversation should be excluded.

The uterus, which has grown to an organ weighing approximately two pounds, returns to its original weight of two ounces in less than two months. This rapid decrease in size and weight is known as involution or atrophy. There is not an actual destruction of tissue or reduction in the number of muscle fibers, but simply a decrease in size until they are only one-twentieth of their former magnitude. The inner surface of the uterus is loose and corrugated, and, at the place where the placenta has been torn away, it is granular and bleeding. In the course of a month or six weeks the inside of the uterus is covered over and replaced by a smooth velvetlike mucous lining. The mouth of the uterus, through which the baby has passed, is often ragged and torn and shrinks down to one finger in diameter within two weeks. The vaginal outlet and vagina are markedly distended and never quite return to their original size and shape. Because of this enormous distention, the attachments of the bladder and rectum are loosened and these organs frequently bulge downward into the relaxed vaginal outlet.

Following delivery there is usually a slight rise in temperature without apparent cause. Before the knowledge of germ infection it was commonly believed that the accumulation of noxious humors, the admission of cold air to the body, the suppression of lacteal secretions, and emotional upsets were the causes of this fever. We now know that childbed fever is the result of bacterial invasion of the tissues, and a rise in temperature may mark the beginning of what may prove to be a very serious condition. It is to avoid the entrance of infective organisms into the open wounds that the services of a trained nurse are necessary. She is more or less responsible for any infection that occurs, following delivery. It is also her duty to observe the nipples constantly for

cracks or fissures and to take special pains to prevent the entrance of germs that cause breast abscesses.

AFTER-PAINS.—For the first few days following delivery many patients, particularly those who have given birth to several children, complain of cramps in the lower abdomen, commonly known as after-pains. These at times are so severe that they disturb the patient's rest, and have to be controlled by hypodermic injections. As a rule, however, a teaspoonful of paregoric is sufficient to allay the discomfort. After-pains are usually the result of a relaxation or a lack of tone of the uterus, which allows the accumulation of blood clots within its cavity. The contractions of the uterus in its effort to expel these materials give rise to the painful sensations. As a rule the pains are more noticeable when the baby is put to the breast.

LOCHIA.—The vaginal discharge that accompanies the restorative processes within the uterus is known as "lochia." In the olden days it was known as "the cleansings," from which the name is derived. The discharge comes mostly from the mouths of the vessels exposed by the separation of the placenta. It is therefore a natural process that accompanies the repair of the lining of the uterus and not the discharge of poisonous materials, as many women suppose. For the first few days the lochia is bright red in color, and consists mostly of blood and bloodclots. During the second week it becomes paler or brownish in color and by the end of the second week it becomes yellowish or whitish and consists mostly of mucus with a mixture of disintegrated cells. The amount of lochia varies from ten to fifteen ounces during this time. It is more profuse in those who get up early and in those who refuse to nurse their babies. Strange to say, severe infections are usually accompanied by a scanty watery discharge free from disagreeable odors. A foul odor is the result of putrefactive changes and

indicative of infection, but not the serious type of infection that produces puerperal fever.

VAGINAL DOUCHES are not necessary to clear the system of this material. If given early they may introduce infective organisms and actually do harm. After the second week the wounds of the genital tract have healed and the danger of infection is practically over. After this time douching is less objectionable and the patient may take a tub bath if she desires. Many patients continue to "spot" a month or six weeks after getting up, but constant bleeding, which weakens the patient, is the result of retained pieces of placenta and should be attended to at once.

RETENTION OF URINE. — A great many women suffer from inability to empty the bladder, following childbirth. Such a condition frequently follows operative delivery, but more commonly it comes about as the result of injury to the bladder and lack of abdominal pressure; or because the patient believes she is not able to empty the bladder unless she gets up. When this occurs, it is better to let the patient sit up than to draw the urine by a catheter.

CONSTIPATION.—Much has been written about constipation. Newspaper advertisements and patent medicines have caused many people to regard it as the cause of all ills. Most adults suffer from this condition. The bedridden patient is naturally more constipated than usual, because of restriction in diet, decreased abdominal pressure, and lack of exercise. Even so, it is not necessary to purge the patient with castor oil or salts; such drastic methods disturb her rest, fatigue the bowels, and leave her more constipated than before. Enemas are objectionable because they frequently become a habit. Naturally the patient feels more comfortable if the bowels move daily, and this is best secured by giving a mild laxative the night before, followed by an enema the next day, if needed.

DIET.—If the patient is not suffering from any complications of pregnancy and the delivery has been natural, there is no real need for any radical change in the diet, except that the amount of food should be somewhat restricted because of the lack of exercise. Shortly after the baby is born, if the patient feels chilly and tired, a glass of warm milk or a cup of chocolate will supply the necessary fluid and promote rest and sleep.

After a refreshing sleep the patient usually calls for liquids to quench the inevitable thirst which is the result of active perspiration and loss of blood during labor. This fluid may be supplied by milk, broth, cocoa, chocolate, or thin cereals. After the first twenty-four or forty-eight hours, the average patient is not really ill and can usually choose a light, nourishing, and easily digested diet from the following list: Cereals, creamed soup and bouillons, eggs, fish or meat once a day, vegetables, salads, fruits, and desserts. It goes without saying, that foods that are known to cause indigestion should be eliminated. If such foods as onions, asparagus, or cabbage, do not cause digestive upsets in the mother, they will not upset the child, as commonly supposed, but may be, and usually are, of real benefit in supplying vitamines. It is advisable, but not necessary, for the patient to drink a quart or more of raw milk daily. As stated before, milk is a perfect food and contains all the life-giving substances. It has a tendency to increase the quality and quantity of breast milk. As a general rule, if the mother does not have the proper kind of nutritious food the baby cannot be expected to thrive well. A certain amount of accessory food substances, protective foods, or vitamines are essential to the baby's well-being.

Not so long ago it was the custom to keep the new mother on liquids and semisolids for some time following delivery. This grew out of the old mistaken idea that food produced heat and puerperal fever. We now know that such treatment is unnecessary and actually delays convalescence. The patient's appetite is a fair guide to the kind and quantity of food best fitted to her

needs. A healthy person's appetite will revolt in time, if overloaded with somebody's scientific hobbies. Patients who force themselves to eat rich foods or drink extra quantities of milk produce fat rather than milk. Mothers and babies apparently do better if the mother eats three regular meals a day and takes a cup of chocolate, eggnog, plain milk, or malted milk between meals if she desires.

EXERCISE.—As soon as the patient feels rested and has recovered from the soreness caused by the muscular exertion of labor, it is well for her to begin systematic, active movement of the muscles of the body, in preparation for regaining her feet. Such physical exertion is sufficient to retain and maintain the tonicity of the muscles and hasten convalescence. For the first week the familiar, deep-breathing, neck-and-arm exercises are sufficient. These should be practiced morning and evening for about five minutes. During the second week, other exercises may be added, such as knee-flexing, leg-raising, and setting-up exercises. If the patient places her hand upon the abdomen, and attempts to raise the head and thorax or lift the legs, she can feel the recti muscles tighten and relax. It is the permanent relaxation and loss of tone in the abdominal muscles that cause pendulous abdomens, high stomachs, or unshapeliness. It is to prevent the occurrence of this disfigurement and to improve the general circulation and vitality that such a system of exercise is intended (Figure 26).

Toward the end of the second week it is well for the patient to lie upon the abdomen for twenty minutes, morning and evening. She should be taught the knee-chest position and assume this position for five minutes, two or three times daily. These exercises are intended to prevent backward misplacements of the uterus; at least they help to prevent the uterus from becoming permanently held backward in the pelvis by inflammatory attachments. As soon as the patient is out of bed it is well to supple-

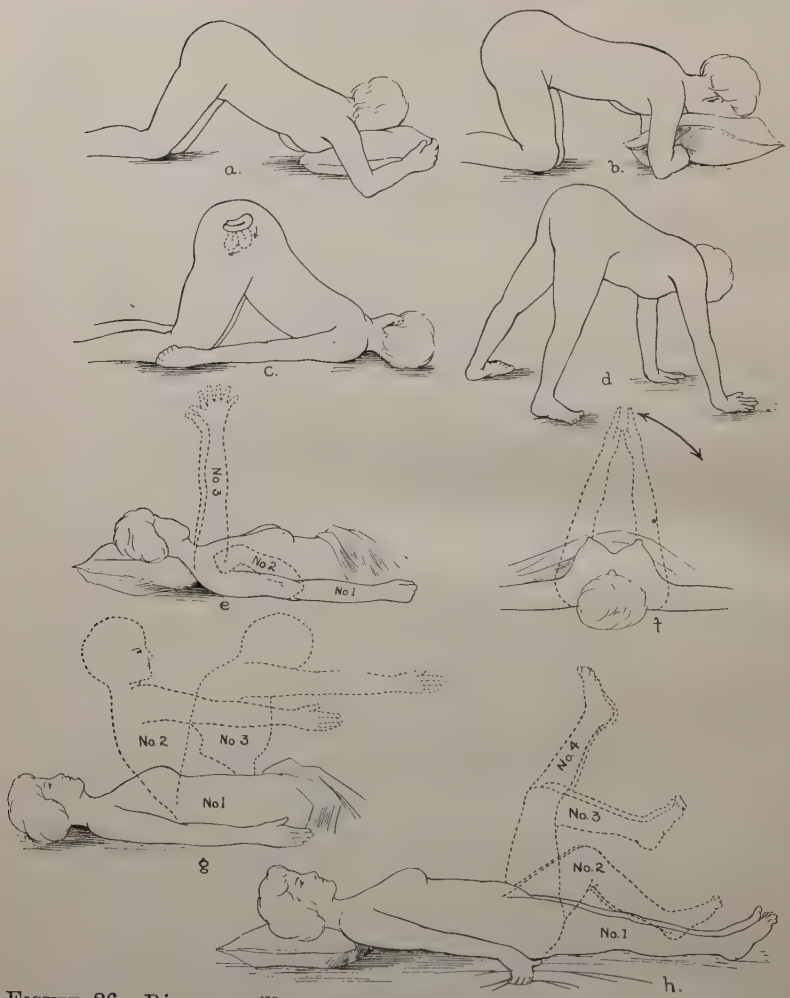


FIGURE 26. *Diagrams illustrating exercises intended to hasten convalescence.*

(a) Incorrect. Knees slant away from body. (b) Incorrect. Resting on elbows. (c) Correct. Hips well up, chest low. Air enters vagina. Uterus falls forward. (d) Correct. Relieves pelvic congestion, prevents displacement and promotes involution. (e–h) Illustrate bed exercises to strengthen the muscles and stimulate the circulation preparatory to getting up.

ment these exercises by walking on all "fours" for a short period, two or three times daily, for a week or so.

PRESERVATION OF THE FIGURE. — Although it is every woman's desire to retain her slender figure as long as possible, there are only a few women who possess the diligence and will power to overcome a natural tendency to become fat and unshapely. Too many women are inclined to take things as they come and accept the onslaughts of old age as inevitable. It is true, however, that some women are born with weak muscles and tissues that relax and stretch and do not return to normal readily, while other women have a tendency to increase in weight and become more matronly in appearance as a result of motherhood. Although minor changes such as these take place in all women to a certain extent, the relaxed, pendulous, flabby abdomen is more or less the result of lack of care, or slothfulness.

The relaxed abdomen is a result of weakening and stretching of the muscles and tissues of the wall of the abdomen by the enlarging child. Following labor the intestines have a tendency to fill, become distended with gas, and sag forward. Every effort should be made to support these injured tissues until they are able to regain their former tone. This is one of the reasons for lying-in, following delivery, and the systematic adherence to massage and exercise of these parts will undoubtedly help their return to normal. A proper support to the abdominal wall during the later months of pregnancy and following the confinement period is advisable and does much to prevent disfigurement in women who are inclined to have a pendulous abdomen.

Another very common cause of pendulous abdomens is the rapid succession of pregnancies. When one pregnancy follows closely upon the preceding one, the abdominal wall does not have sufficient time to regain its proper tone, and the muscles and tissues stretch and relax under the constant strain. Nature seems to have predicted such a deleterious effect on the maternal organism

and has attempted to prevent the close proximity of pregnancies by the prevention of ovulation and menstruation during the nursing period.

Probably the most common cause of enlarged abdomens is the accumulation of fat under the abdominal skin, in the muscles of the abdominal wall, and in the apron of fat within the abdomen. Obesity is the result of eating more food than the body requires. This excess energy (fat) is stored within the body tissues, to be used in times of starvation. In modern times life has become more sedentary and there are no periods of famine. For this reason the accumulation of fat becomes a burden to the body, rather than an asset for which it was originally planned. Obesity can always be prevented by restricting the diet to the actual needs of the body. Reduction in weight may always be accomplished by starvation or by increasing the outgo of energy above the intake. This is best accomplished by increase of exercise and restriction of diet, and not by the use of drugs.

GETTING UP.—At various times in the past, women have been urged to get up, following delivery, just as animals are forced to do following the birth of their young. Such attempts have always failed because of the bad effects that follow such procedures. The reason for this is that the posture of woman in walking differs from that of all other animals. In assuming the upright position the blood gravitates to the pelvis and the weight of the abdominal viscera presses upon the heavy organs, which in turn have to be supported to prevent them from falling out through the relaxed and injured tissues of the pelvic floor. This indicates that the new mother should stay in bed until the tissues of the reproductive organs and birth canal have regained some of their original strength.

The length of stay in bed depends upon the progress of the individual, since some women regain strength and return to normal more rapidly than others. Naturally women who have

fever, or those who have been badly torn, will be forced to remain quiet somewhat longer than usual. The injured tissues have stretched to their physiological limit before the tear takes place, so that the sewing together of the torn edge does not necessarily bring the tissues back to normal. In some cases tears occur beneath the mucous covering of the birth canal and no laceration is seen on examination. In fact, some of the worst cases of relaxation of the vaginal outlet occur in patients who have no visible laceration. It is to prevent such undue injury that some physicians deliberately sever the tissues of the perineum before delivering the head. This minor operation is known as episiotomy.

Experience has shown that every woman will do well to remain in bed at least ten days, because the uterus and birth canal do not approach normal before that time. For their future welfare it is best that they remain in bed the full two weeks. The failure to accept such treatment is the cause of many ills and reparative operations that occur later in life.

There is no reason why a patient should be forced to lie flat upon her back during this time. She will be more comfortable and the uterus will drain better if she is allowed a low back rest following delivery. By the end of the first week such a patient will be able to sit up in bed for her meals. If she has already begun exercise of the various muscles of her body, and convalescence is progressing satisfactorily, she should be allowed to sit up in a chair on the twelfth or fourteenth day and should attempt to walk a day or so later.

It is not wise to attempt too much on getting up, because fatigue lessens the tone of the muscles and produces relaxation and prolapse. For this reason the patient should remain up not more than an hour the first day and increase this an hour each day until she is able to remain up without fatigue. It is a very good plan to confine the patient to her room for the following week to prevent her from resuming her regular household duties, which most women will do, regardless of any promise to the con-

trary. For this reason doctors tell their patients not to go downstairs before the end of the third or fourth week.

FINAL EXAMINATION.—As a rule, two pelvic examinations are necessary following the delivery of the child. The first examination is done about the tenth or twelfth day to ascertain the progress of the involution of the uterus and the perineum. If the uterus is large and boggy, the vaginal discharge profuse, or the perineal floor unduly relaxed, the patient is instructed to take suitable treatment to hasten the return to normal.

When the baby is a month or six weeks old, the patient should report for final examination. This is the time when many female complications may be ascertained and corrected, and many subsequent operations avoided. In other words, the manner in which restoration has taken place can usually be determined at this examination. In more than one-half the cases, the size and position of the uterus, the elasticity and strength of the uterine ligaments, and the restoration of the pelvic floor are more or less satisfactory. In about 25 per cent of the cases the uterus is found displaced and suitable exercises are taken, or a suitable support for the uterus (pessary) should be worn to prevent the misplacement from becoming permanent. The assumption of the knee-chest position for ten minutes, three or four times daily, and hot vaginal douches will sometimes work wonders in preventing many of the serious complications.

If the patient's general circulation is not up to standard, the various organs of the body are improperly nourished and resolution is sluggish. In such cases the blood gravitates to the abdominal viscera and pelvis, and produces indigestion, which in turn lowers the vitality. Suitable indoor and outdoor exercises and other hygienic measures that will improve the muscular tone and stimulate the circulation are therefore advisable.

CARE OF THE NEW BABY.—As soon as the baby is born it is held up by the feet to drain any fluid or mucus that might be in the mouth. The child is then laid down, and the eyelids sponged off with a warm boric solution to prevent infection from entering the eyes. A few drops of some silver preparation, usually silver nitrate 2 per cent, or argyrol 15 per cent, is instilled directly into the eye to prevent eye disease and possible blindness. The cord is tied after pulsation ceases and cut about one inch from the umbilicus of the baby. A sterile dressing is applied to the severed cord and an abdominal band is pinned about the abdomen to hold the dressing in place. The child is then handed to the nurse for further care. In the hospital the footprints and other means of identification are made before the baby leaves the delivery room.

CORD DRESSINGS.—The cord dressing applied at birth is changed only if it becomes wet or soiled; its sole purpose is to prevent infection from gaining entrance into the body. The nurse changes it under strict aseptic conditions and sews the band in place to prevent the dressing from becoming displaced. After the cord falls off and the stump is dry and healed, the band may be removed and the child given a full bath. Remember, the band is not a truss and can be left off with safety as soon as the cord is off and the navel is clean and dry.

BATHING.—Before the newborn infant is dressed, he is thoroughly covered with a generous supply of warm olive oil or mineral oil. This is done to remove the vernix caseosa, a greasy material that covers the bodies of all babies at birth, some more than others, and to prevent a certain amount of shock from evaporation or heat radiation. The oil is soon sponged off, the child dressed and placed in a warm crib.

The next morning the child is sponged off with soap and warm water, care being taken to prevent soiling the abdominal

band. These sponge baths are continued until the cord is off and the stump healed. It is not safe to give a full tub bath before this time.

The technic of bathing the baby is simple, but important. The room should be moderately warm, 80 degrees to 85 degrees Fahrenheit, and the water heated to between 98 degrees and 100 degrees Fahrenheit, i. e., about body temperature. Only pure castile soap, or soap free from strong chemicals, should be used. The wash cloths and towels should be of soft texture to prevent scratching and irritating the soft skin. The mother should carefully wash her hands in warm water and take the baby in her lap, or place it upon a pillow, which is covered by a soft blanket and a warm bath towel. The baby is partially uncovered, and one part at a time washed, taking care not to expose the child to cold. Four or five minutes is sufficient time for a sponge bath.

The head should be washed first—the eyes are sponged off with warm boric solution and the face cleansed with the clear water. The scalp is then lathered with soap and quickly rinsed off. The head is then dried with a soft towel and the rest of the body uncovered. The body and limbs are quickly covered with fresh soapsuds and the child lowered into the bath with the head and neck kept well out of water. The child is gently rinsed off and then taken back onto the lap or pillow and dried. The mother should take particular pains not to allow any soap to remain under the arms or between the legs. Talcum powder is then dusted over the parts that are most likely to chafe. Babies that are properly bathed and not chilled by cold water or scalded by hot water look forward to their bath with pleasure and enjoy the process.

CARE OF THE EYES. — If there is no irritation or discharge, the eyes should be left alone, except at the time of the daily bath, when the lids are sponged off with a pledget of cotton

dipped in boric acid. If there is any irritation, they should be treated by the physician.

CARE OF THE EARS AND NOSE.—These are best left alone. If secretions accumulate they may be gently wiped away by a twirl of cotton on the end of a toothpick or applicator.

CARE OF THE MOUTH.—Care should be taken that the child does not injure the mouth with sharp objects, or suck unclean objects. Sponging out the mouth will injure the delicate mucous lining and do more harm than good. Pacifiers have little to recommend them. They are usually dirty, unsightly, and are worthless if the baby has been properly trained.

CARE OF THE BUTTOCKS AND GENITALS. — The buttocks should be cleansed with clean water after each wetting or soiling.

The genitals should be kept clean to prevent discomfort, irritation, and bad habits.

CHAPTER XVI

THE NEW MOTHER AND BABY

A GREAT AMOUNT of the modern girl's time is spent away from home and family cares. Until the time of marriage her life is filled almost entirely with outside interests. She is not interested in children and the care of babies is the least of her worries. When the first baby arrives she is practically unprepared and incapable of taking care of it. She is suddenly thrust into a new life, of which she knows little or nothing. Instinctively she knows that when the baby cries it is calling for her. She has no idea what it wants (and most often it does not want anything), but she is inspired with an intense desire to do something for it. She soon discovers how inadequate her training has been and how unprepared she is to understand it. Her whole life seems to be completely changed with the first cry of her baby. Her love for the child and the new responsibilities connected with it cause her incessant worry, tax her physical strength, and interfere with her better judgment. In other words, the modern girl is so inexperienced and ill-prepared to assume the care of her child that she loses all confidence, becomes discouraged, and naturally accepts all proffered advice. If the advice is not good both she and the baby suffer.

Many mothers have lost their babies by following the advice of well-meaning but ignorant friends. It is astonishing to see how some infants survive the detailed attention and energetic application and "home remedies." No wonder it is said, "God watches over little children." If He did not the race would soon perish. There are too many women who feel it their duty to express an opinion on the care and feeding of the new infant. Where the new mother has two or more friends of this type, a serious conflict is sure to arise; and the baby suffers the consequences. Recently I had a young mother who asked to remain in the hospital

a week longer than usual, to avoid as long as possible a conflict between two such family advisers. She knew from past experience that her baby always suffered from their interference.

It is well for the new mother to bear in mind that the new life has been fashioned to survive its new environment, and that every departure from nature's method should be viewed with suspicion until time has proved that it is safe and sane. The abundance of conflicting counsel should be sufficient to cause the mother to be wary. If she will reflect that babies thrived and grew long before artificial feeding was introduced and before there was a drug store on every corner, she would worry less and have more confidence in her ability to nurse the child and to keep him healthy, without the aid of medicines.

Within recent years the larger cities have recognized the evil of promiscuous advice and have organized baby clinics where intelligent information may be obtained free of charge. Only well babies are watched; sick babies are referred to the family physician for treatment. This is an attempt to keep the babies healthy by teaching the mother the fundamental points so necessary for the welfare of every child. It is a sincere desire on the part of the child specialist to make the rearing of children more reasonable and less burdensome.

It must be borne in mind that the new baby is dependent upon its mother for its start in life. Birth is simply a continuation of the life of the child outside of the uterus. Previously to birth, the child has had its nourishment automatically supplied from the mother's blood stream. The amniotic fluid surrounding it protected it from injury and exposure. Its temperature was always the same and it was free from external irritations, such as light, noise, or pain. At birth its environment is entirely changed. It has to be nourished and protected against all the irritating influences of the outside world. During the first few weeks following birth all it requires is to be fed regularly and kept dry and warm. It wants to be comfortable and does not need to be

picked up every time it cries, though nervous mothers soon teach their babies to continue to cry until they are taken up. Too much handling is not good for the child. It taxes the strength of the mother and causes her to be fretful and irritable. It lowers her vitality and reduces the quality of the breast milk, which interferes with the nutrition of the child. A vicious cycle is begun: the more the mother worries, the more irritable and fretful the baby becomes; and the more the baby suffers, the more the mother worries.

INFANT FEEDING.—In a previous chapter cow's milk was described as a perfect food because it contained all the essential elements in about the right proportions necessary to maintain life. It is necessary at this time to qualify that statement in regard to infant feeding. It is a matter of common observation, in the feeding of young animals, that the offspring thrives best on the mother's milk—the milk that nature intended it to have. If such milk is not available the milk of another animal of the same species is next best, and if this is not available the milk of some different animal has to be substituted. Evidently the offspring and the milk that nature has intended for it have been closely adapted to one another. In other words, the mother's breast milk is the best milk for her infant. No other milk can exactly take its place.

All modifications of cow's milk or prepared foods are substitutes, as proved by the increase in death rate among artificially fed babies. Chemical analysis has shown that breast milk differs slightly from cow's milk in that it contains more sugar and less protein, as seen in the following analysis:

Composition of milk—	*Mother's*	*Cow's*
Fat	3.50	4.00
Sugar	7.00	4.50
Protein	1.25	3.50
Minerals	0.20	0.75
Water	88.05	87.25

At first it was thought that this was the only difference, and modifications of the cow's milk were made to meet these requirements. It was soon discovered that there were other fundamental differences that could not be altered.

Although mother's milk contains all the essential elements in the right proportions and in the most digestible form, it also contains certain protective food substances that are necessary for the growth of the child and the building up of its resistance to disease. The feeding of foods lacking in these protective substances is the cause of many nervous, mental, and physical abnormalities in children. Scurvy and rickets (of which bowing of the legs is a symptom) are some examples of these nutritional deficiencies. There are also a great number of infants and children who have all the earmarks of health, but because of the lack of these accessory food substances are the victims of every infection that comes along. These unfortunate children are neither sick nor well, but half sick and half well most of the time. There are many more of these children than the public supposes. Most of them are artificially fed babies, but a few are breast fed. The breast-fed babies that suffer from these nutritional deficiencies are the children of mothers whose diets are deficient in vitamines and who are themselves the victims of nutritional disturbances.

THE PRODUCTION OF MILK.—In order for any mother to feed successfully her new infant she must be physically and mentally well. The mental state has a great influence on the quality and quantity of the milk. A mother who is emotionally upset, or who nurses her baby after a fit of anger, may entirely change the quality and quantity of the milk and temporarily upset the child. It is a known fact that such breast milk may cause serious disturbances, even convulsions in the child. Anxiety, fatigue, worry, or fright have the same effect. Many a fond mother has "lost her milk" because of unnecessary worry about her baby's health.

The diet of the nursing mother is of considerable importance. It should consist of simple foods with an abundance of fluid. Fresh fruits, vegetables, and raw milk are essential. Meat, particularly fried foods, should be restricted, if possible, to once daily. Tea and coffee should be used in moderation. As far as I know there is no particular food that will stimulate lactation, but milk, gruel, and chocolate are advisable because they supply fluid and are easily digested.

By far the most important point in the production of milk is a sincere desire on the part of the mother to nurse the baby, and the ability of the baby to nurse properly. The breasts do not con-

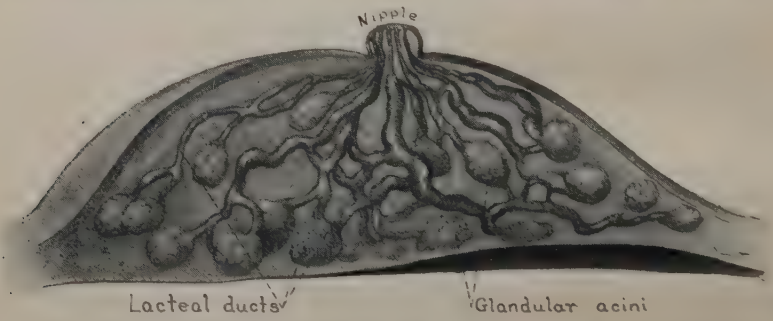


Figure 27. Diagrammatic drawing of lactating breast.

tain the milk in the sense of a reservoir, but manufacture it according to the needs of the infant (Figure 27).

A strong healthy baby or twins will induce twice as much milk as a small weak child that is unable to nurse vigorously. Again the same baby at six months will require and induce three times as much milk as it did in the earlier months. It is simply a matter of supply and demand. The dairyman knows very well that in order to produce milk the cow must be milked dry. It is a known fact that if the calf is weaned and the cow is well milked, she will give enough milk for two or three calves, provided the animal

has good food and is not upset by worry or fatigue. It is also a fact that the last milk is the richest and the best.

Any mother who does not have a sufficient amount of milk for the baby can always increase the amount by "stripping" or milking the breasts after the baby has done nursing. This is best accomplished with the hands and not with the breast pump. In order to do this, the breasts should be grasped firmly outside the areola by the first finger and thumb to prevent the milk in the ducts from escaping back into the breast lacteals, and then gently bringing the finger and thumb together in a clutching manner. It may be difficult to start the milk, but after a few trials the milk will begin to flow, if the child has only partially emptied the breast. This method of expression must be continued on each breast for five or ten minutes after each nursing, even though only a few drops of milk are obtained at first. After a few trials the gland will be stimulated to secrete abundantly, and the child will obtain sufficient nourishment. In order to continue the flow, the breasts must be regularly nursed and completely emptied.

The only real way of ascertaining if the baby is getting enough nourishment is to weigh it at regular intervals. Most obstetricians today urge the new mother to bring the baby to the office once a week during the early weeks, and later every two weeks until the baby is weaned. For the first six months the child should gain from six to eight ounces a week. After this period there is a gradual diminution in the weekly gain.

GROWTH AND DEVELOPMENT OF CHILDREN

Age—	*Birth*	*One Month*	*Four Months*	*Six Months*	*One Year*	*Eighteen Months*	*Two Years*	*Three Years*	*Four Years*
Weight, average lbs..	7–8	8–9	12–14	15–16	20–21	22–24	26–27	30–32	34–36
Height, inches	19–20	21.4	23.8	25.4	29	30.5	32.5	35	38
Head, inches	14	14.4	16.2	17	18	18.5	19.9	19.3	19.7
Chest, inches	13	13.7	15.5	16.5	18	18.5	19	20.1	20.7
Abdomen, inches	13	13.6	15.4	16.1	17.6	18.2	18.7	20	21
Teeth (first or temporary set)				1	6	12	18	20	20

When the baby is getting insufficient nourishment, the weight remains stationary, or falls, the child becoming cross and fretful.

The baby appears constipated or the stools may become greenish in color and small in amount. Such a baby, when put to the breast, will nurse ravenously and cry when removed. A great many mothers, who have an abundance of breast milk, which flows freely, make the common mistake of allowing the baby to nurse too rapidly. The child soon overloads its stomach, which causes it to vomit and lose the greater part of its nourishment. Overloading the stomach is the most common cause of vomiting in healthy babies. It is also a common cause of indigestion and colic, restlessness, and irritability. Such babies should be prevented from nursing too fast and too long.

A certain amount of crying is perfectly natural and necessary for the proper development of the child. At such times the baby breathes deeply, expands the lungs, exercises the muscles, and stimulates the circulation. As a rule, crying hurts the mother much more than it does the child. Crying was more than likely intended by nature to prevent the mother from straying too far from the infant and thus leaving it without her care and protection.

RECREATION AND DIVERSION.—The nursing mother should lead a simple life, take a moderate amount of outdoor exercise, and insist on plenty of rest and sleep. The work should be arranged to avoid fatigue and to allow for recreation. It is sometimes a good plan after the baby is three months old to substitute a bottle feeding for one of the afternoon feedings. Such a plan allows the mother to mingle with friends or to enjoy an afternoon away from the baby.

If the baby is properly trained in the matter of feeding during the first few weeks of its life, the mother need not fear for its future health. During the first two or three days it should be put to the breasts three or four times daily to stimulate milk production. Although the breasts do not secrete milk at first, the child procures some fluid (colostrum), which acts as a laxative. Dur-

ing this time the child recovers from its lethargy and develops a healthy appetite. As soon as the milk "comes in" the child should be nursed at regular intervals and not too long at a time. It should be wakened for its feedings if necessary, and in a short while a regular habit will be established. The mother need not be too punctual in this manner, as a slight leeway of a few minutes, one way or the other, is not an unpardonable crime. The baby should be nursed about ten to thirty minutes, depending upon the vigor with which it nurses, and the ease with which the milk flows from the breast. The average baby should nurse about twenty minutes, and not be allowed to nurse a few minutes, stop and play, and then be coaxed back to its nursing again.

THE VALUE OF REGULAR NURSING.—As soon as the milk "comes in" the baby should be put on a regular schedule. The reason for this is to allow the stomach to empty itself before a new feeding is "poured in." Babies that are nursed regularly are better behaved, thrive better, and are easier to take care of. There is no hard and fast rule about the interval between nursings, but most babies do equally well, whether placed on a three or four-hour schedule. The four-hour interval gives the mother more time for recreation. The three-hour schedule of seven feedings, the last at 11 p.m. and the first at 5 a.m., is the one most commonly followed. There are a few babies, however, that apparently do better on a two-hour schedule. These cases are rare and need the attention of a baby specialist.

Regular nursing does not mean that babies that are irregularly nursed do not do well. I have seen large healthy babies who are picked up and put to the breast every time they cry. But such children are usually a constant care and burden to the mother; they interfere with her work, disturb her rest, and reduce the quality of the breast milk.

The breasts should be nursed alternately to insure better emptying, which stimulates milk production. The nipple and

areola, or dark area, should be cleansed with a boric acid solution before each nursing and the child allowed to grasp the areola as well as the nipple. The failure to "give the breast to the baby" often is the cause of poor nursing. If the nipples are kept soft and clean, and there are no cracks or fissures, the mother need not fear breast infection. If injury to the nipple should occur, the injured tissue should be promptly treated, and if bleeding occurs a nipple shield should be used to prevent breast infection and abscess.

A WELL BABY'S DAILY PROGRAM

	Three-hour feeding interval	*Four-hour feeding interval*
Early morning nursing	6:00 a. m.	6:00 a. m.
Plays in crib or pen	6:30–8:30	6:30–9:30
Takes fruit juice (after three months)	8:30	9:30
Bath	8:30	9:30
Mid-morning nursing	9:00	10:00
Long nap, outdoors if possible	9:30–12:00 m.	10:30–2:00 p. m.
Midday nursing	12:00	2:00
Short nap, outdoors if possible	1:00–2:30 p. m.	2:30–3:30
Mid-afternoon nursing	3:00	None
Awake, outdoors in suitable weather	3:30–5:30	3:30–5:30
Undressed and rubbed, clothes changed	5:30	5:30
Bedtime nursing, and put to sleep	6:00 p. m.	6:00 p. m.
Night nursing	10:00 or later	10:00 or later
Unbroken sleep	Until morning	Until morning

WEANING.—Weaning the baby from the breast should be a gradual process. Formerly the mother stopped short at the end of nine months or a year and placed the baby on an entirely new diet. The breasts usually became swollen, hard, and painful (caked), and the baby suffered more or less from digestive disturbances, because of the sudden change of diet. Nowadays it is thought best to begin supplying one food after another, after the sixth month, and some baby specialists (Holt) even advocate the feeding of simple foods after the third month.

Weaning is best accomplished by first substituting one feeding each day of modified cow's milk for a breast nursing, until the baby becomes accustomed to the change, and later substituting

two feedings, then three feedings, and so on, until a complete transfer is made. If such a substitution is begun at the sixth month, and two bottle feedings for the seventh, and three for the eighth, and so on, the child will gradually wean itself, and the mother's breasts will dry up without further treatment. The first bottle feedings should be less than the usual strength, and gradually strengthened until they contain sufficient nourishment for growth. The ease with which the substitution takes place depends to a large extent upon the effort the baby has to make to obtain the milk. If the milk is difficult to procure from the breast, but is obtained with ease from the bottle, the mother must be careful that the baby does not give up the breast and confine itself to the bottle.

There are certain diseases and malformations that prohibit nursing, either from the outset or earlier than desired. Tuberculosis, advanced heart or kidney disease, diabetes in the mother, and diseases and malformations of the breast may prohibit nursing altogether. Loss of milk from intercurrent diseases, or a poor quality of the milk, may be the reason for bottle feeding earlier than desired.

By far the most common reason for early bottle feeding is the lack of desire or inability of the mother to nurse the baby, because of economic reasons. Some women are forced to "farm" the baby out in order to support themselves and child, and other women feel that they cannot afford the time and inconvenience and the separation from friends and social pleasures. In either case it is quite possible for such women to nurse the baby part time at least. If the mother can give the baby but two or three feedings a day, she should do so in the interests of the innocent dependent.

The return of menstruation, contrary to common belief, does not materially change the quality and quantity of the breast milk, and is therefore no excuse for weaning the child. A supervening pregnancy, however, does affect the character of the milk, and under this condition the baby should shortly be weaned to pre-

vent undernourishment on its own part or possible miscarriage on the part of the mother. Prolonged lactation materially affects the health of the mother and should not be continued beyond the first year.

CHAPTER XVII

CHARACTERISTICS OF A HEALTHY BABY

It is important for any mother to know the characteristics of a healthy baby, so that she will not be constantly trying to change normal habits. It is well for her to form a mental picture of how the normal child acts, for if she knows how it looks and how it acts she ought to be able to detect the beginning of abnormal conditions before they become serious or fixed. There are too many women who tire their minds and weary their muscles by trying to change normal traits. They seem to be obsessed with the idea that their baby is on the verge of some calamity, and are continually searching for something that has gone wrong or is likely to go wrong. If the baby cries they feel that it must be suffering from colic, or if it sleeps too long it must be suffering from sleeping sickness or some other serious malady. These fond mothers seldom pause long enough to realize that crying and sleeping are characteristics of a healthy baby. They bend every effort to prevent disaster, and in so doing they destroy the quality of their milk and actually upset the child's digestion. They soon work themselves into a nervous state, which is quickly reflected on the impressionable mind of the child.

It would be much better for these mothers to give the feeding and care of their babies into the hands of a competent child specialist. But experience has shown that these mothers are the very ones who "cannot be told," for, even though they do procure supervision, they continue to treat the baby according to their own ideas.

Any new mother will do well to observe other animals in order to learn the natural way of caring for the young. In the lower forms where the offspring are numerous there is an extravagant waste of life, but as we ascend to the higher forms there is a gradual strengthening of the maternal instinct and a progressive econ-

omy of life. In the higher forms of animal life (mammals), where rigid economy has to be practiced, the mother takes rather good care of her young, much better than one is likely to suppose. The cow, for instance, soon teaches her calf to avoid the hot sun and protect itself from the wet and cold; she beds it in the tall grass, where it may rest in peace and comfort during the heat of the day. She hides it whenever she has to leave it and stands by if any wild animal is near that might harm it. In other words, animals have a pure maternal instinct, the product of evolution, unadulterated by civilization. The animals whose mothers did not come when their young called either starved to death or were destroyed by beasts of prey. At any rate it is safe to say they did not all die from colic, or from lack of soothing syrups. Evolution also eliminated those strains that did not have sufficient nourishment for their offspring and developed other strains that could produce milk in sufficient quantity. The human race is no exception. At least 95 to 98 per cent of mothers can produce enough milk for their babies, if they so desire, by following the method of emptying the breasts as outlined under "Infant Feeding."

There is one fairly safe way of ascertaining the health of the child and that is by comparing its weight and development with the weight and development of the normal infant. This does not mean that all infants should be made to weigh the same, because infants vary just as adults vary in weight. They vary according to their age at birth, and according to the physical characteristics of their parents. There is such a marked variation in the birth weight of babies that any casual observer may see at a glance that a standard weight for all babies is no fair basis on which to estimate the child's progress. Some infants are small because they are born prematurely, while others are born post-maturely and are large. Because of this wide variation it is far better to compare the weight with the height and both of these figures with the age and birth weight. In other words, if the weight of a

nursing infant compares favorably with the height, and the child is gaining from six to eight ounces each week, the mother need have little anxiety about it (page 205).

It is important that every mother should know that her newborn babe forms habits at a very early age, which are retained throughout its whole life. It is said on good authority that the child learns as much during the first three weeks of its existence as it does in all of the years that follow. If this is true it is important that the child be given the proper training and environment to form good habits from the very beginning. Any observant mother soon learns that the tiny infant is able to recognize slight departures from its regular routine care. It is but a short time, only a week or so, until he is able to detect quite accurately his feeding time and his hours for rest and sleep. All of these habits soon become fixed and form a part of his very nature. If all mothers were able to overcome their innate tendency to worry and fuss, their children in turn would not have these same difficulties to contend with in the rearing of their children. In this way a stronger race would be built up, with far greater capacity for health and happiness.

Anxiety and worry interfere with the health of any individual. A healthy person may be made ill and a convalescent patient may be so retarded that she will never regain her former health. In the hope that mothers will worry less and that child raising will be less burdensome, a few of the prerequisites of a normal child are enumerated below.

At the time of birth there is an abrupt change in the life of the infant. From dark, quiet, peaceful, and comfortable surroundings the child is suddenly transferred to a light, noisy, uncomfortable atmosphere, where it is subject to circulatory, nutritional, and other injurious disturbances. Its temperature before birth was always the same, or nearly so; its food was predigested and supplied automatically; and its higher sensibilities were never called upon to act. In other words, the child was essen-

tially a parasite. At the time of birth the lungs are expanded for the first time and the heart changes the circulation so that oxygen may be procured from the air for the combustion of food. Also, the digestive tract and organs of elimination begin to function. The brain is so poorly developed and the special senses are so unstable that it is doubtful if they function at all at birth.

The growing child is essentially a combination of inheritance, nutrition, and environment. The mother cannot in any way change its hereditary characteristics, but she can influence its nutrition and environment at will. She should make as great an effort as possible to make the change from intrauterine to extrauterine life as gradually as possible. She should give the child essentially the same food (breast milk) and endeavor to make the surroundings as quiet, comfortable, and peaceful as possible.

NURSERY.—The nursery should be the best ventilated and most quiet room in the house. There should be plenty of sunlight and little draft. The temperature should be kept around 70 degrees Fahrenheit, but this is not nearly so important as it is to keep the infant at an even temperature, neither too hot nor too cold. Its heat-regulating apparatus is poorly developed at birth, which makes it very sensitive to sudden changes in temperature. Lack of external heat may cause its temperature to fall four or five degrees, and likewise too much external heat may cause the temperature to rise far above normal. One extreme is as bad as the other.

Most mothers are inclined to bundle the baby up and keep it too warm. It is not uncommon to see babies that are continually drenched in sweat and all but smothered in an endeavor to prevent the child from "catching cold." The idea that cold causes disease is a fallacy that grew out of the old theory that disease was a thickening of certain humors in the body that congealed in the presence of cold and could not be eliminated properly. "Colds" are the result of infection and are contagious, and not

the result of fresh air or cold air. It is true, however, that exposure to drafts, or temperature that lowers the heat of the body, particularly if the child is wet, will lessen the child's vitality and virtually invite different infections.

A separate bed with a firm mattress and clean, dry, porous bedclothes that can be changed readily are the best means of insuring an even temperature. External heat (hot-water bottles) may be supplied in the winter time to make the bed warm after the bath or in the case of delicate "prematures" to keep their temperature up to normal.

The following characteristics of a healthy baby are taken from the Correspondence Study Course of the Minnesota State Board of Health:

The newborn baby has a red "boiled" appearance; his head is large and often misshapen; his face is far from prepossessing; his legs are bowed. He is more or less covered with a white, waxy substance, the "vernix caseosa." His skin, with its coating of fine down, is incredibly soft to touch. Within a week his reddish color fades and often takes on a faintly yellowish tinge. This is due to customary changes in his blood. The coating of fine down begins to fall off, and he will shed more or less of his skin in the form of fine scales. His eyes are a vague sort of blue—like all babies' eyes; only after he is six or seven weeks old will they take on that color which will distinguish them through life. He has an appearance of intelligence, but his wide surmising gaze mirrors a mind profoundly empty. Asleep, he is completely and gracefully relaxed; his mouth is closed and his face expresses an untroubled repose. His breathing is gentle—scarcely noticeable. Awake, after the first few weeks, he moves his arms and legs—scarcely aware that they are a part of his body; his hands grasp at all things—he will cling to an object with astonishing vigor. His cry, directly after he is born, is a most welcome sign to the doctor and parents, for it indicates that his lungs have expanded and filled with air, ready to assume that function so long performed for him by his mother's lungs. Later his cry is vigorous, and the observant mother will carefully note its varying sound as the baby frankly uses his one means of telling everyone within hearing of his hunger, thirst, cold, pain, or displeasure at a feeling of discomfort from whatever cause. His head, after a week or two, becomes rounded and shapely; his features emerge and take shape after those of his mother

or father. His skin, losing its red hue and yellowish tinge in a few weeks, takes on that most attractive pink and white color which we associate with health; his flesh, while soft, has a peculiar "live" resiliency which the mother will quickly learn to distinguish from the "flabbiness" which goes with illness.

BEHAVIOR OF HEALTHY BABY. — For the first few days following birth, the *sleep* of the infant is very profound, depending to a considerable extent upon the duration of labor and the amount of injury to the brain. As the senses develop the child sleeps less and is more easily awakened. For the first two or three days the average child sleeps almost continuously, and for the first three or four weeks the average is from twenty to twenty-two hours a day. At six months he sleeps from sixteen to eighteen hours, and at one year from fourteen to sixteen hours, depending for the most part on the training that he has been given. If the child has been properly trained he will sleep from two to three hours at a time without waking, and sometimes for a period of five to six hours, if he is not hungry or uncomfortable. During sleep the breathing is quiet and more or less regular in contrast with the characteristic irregular breathing when awake.

The waking hours are the periods for developing the muscles, stimulating the circulation, and improving the special senses.

The muscular movements at the time of birth are all instinctive or reflex. If the baby's lips are touched he instinctively makes an attempt to suck; if milk or water is placed in his mouth he automatically swallows, and if his foot is tickled he draws it away and may start to cry. When the child cries he breathes deeply and expands his lungs, tightens the muscles of his extremities and body, and increases the circulation of all parts.

It is not until the third or fourth month that the infant begins to make voluntary movements. For some time previous to this he chuckles to himself and aimlessly waves his unsteady arms in the air and kicks the covers off with his feet. But these movements are entirely involuntary. At the third or fourth month he at-

tempts to grasp objects and may show a desire to sit up. His head is still a bit wobbly, but can be held erect if his body is supported. If he is turned on his stomach he will raise himself on his elbows and follow moving objects with his eyes. At six months he is able to sit alone and begins to stand in his mother's lap. At eight months he will begin to creep and get into mischief. At ten months he will pull himself to his feet and support himself by the edge of his crib. At one year he begins to walk, but may not continue if he becomes frightened.

The mental development is probably the most interesting part of infantile growth, for the rapid changes in the mind are quite remarkable. At the time of birth the baby has no more sense than an ameba, or newly hatched sparrow. Griffith says, "It has little more intelligence than a vegetable. Its soul and intellect are there, but they are dormant, waiting to be awakened." At any rate it has no interest in its surroundings and is entirely dependent upon others for help. The development of the senses is simply an adaptation of the dependent little organism to its surroundings, for the purpose of making it dependent. The organs that make up these special senses have been developed automatically, but they have never been called upon to function. From the moment of birth he begins to use them instinctively and develops them by practice. His sense of sight is present, but very poorly developed. His eyes are apparently sensitive to light at the time of birth, for he will often attempt to avoid it by turning his head or closing his eyes in the presence of a strong light. He may be able to distinguish daylight from darkness and see objects as shadows, but he does not see clearly until he is three or four months old. Because the muscles of the eyes are poorly coördinated, the child is unable to focus properly and often appears cross-eyed. The power of accommodation is a matter of developing the muscles of accommodation by practice. He is often four or five months old before he inspects the various objects about the room and six months or more before he recognizes his toes.

The sense of hearing is so poorly developed that some observers even doubt that the child hears at all during the first twenty-four hours. If he does hear it is by bone conduction, as does the fish, for the middle ear is filled with fluid and air does not enter until the swelling of the tympanum and Eustachian tube subsides. It is remarkable how quickly the sense of hearing develops. It is but a short time until it becomes very acute. At two weeks he will awaken at the least sound and begin to listen before two months have passed.

The sense of taste varies in different babies. Some babies from the very beginning are able to detect changes in the food, while others have no objection to sour milk or objects covered with quinine. The sense of smell is poorly developed and is not acquired by some children until late in infancy or early childhood.

Speech has the greatest variation of all. Girls begin to talk somewhat earlier than boys, and apparently carry this advantage through life. As a rule, it is not until the end of the first year that the child actively employs words to express ideas, although he may associate words with ideas and obey commands much earlier. At the end of the second year he is able to put two or three words together in an imperfect form.

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GLOSSARY

Abnormal—Not natural; deviating from the standard or usual condition.

Abortion—The expulsion of the embryo or fetus during the first twenty-eight weeks of pregnancy.

Acinus—One of the small lobules of a compound gland, like the breast.

Afterbirth—The fetal tissue which follows the birth of the child. It includes the placenta, umbilical cord, and membranes.

After-pains—Pains following the birth of the child and placenta, due to the contraction of the uterus.

Amniotic—A. Sac, the membranes surrounding the fetus. A. Fluid, the fluid contained within the membranes in which the fetus lives.

Anatomy—The structure of the body.

Anemia—Deficiency in the quality of the blood.

Anesthesia—Loss of feeling.

Antiseptic—Anything that kills bacteria and prevents pus formation.

Areola—The dark area about the nipple.

Artery—The blood-vessel leading away from the heart.

Asepsis—Exclusion of infectious bacteria.

Aseptic—Surgically clean.

Asphyxia—Lack of oxygen due to interference with respiration.

Assimilation—The process of digestion and absorption of food substances to make body tissue.

Atrophy—To waste away or weaken.

Bacteria—Micro-organisms or vegetable cells.

Bag-of-waters—The membranes which contain the amniotic fluid and fetus.

Ballottement—The bouncing of the fetus in the amniotic fluid.

Biology—The science of life.

Breech—The buttocks.

Brim—Upper rim of the pelvis.

Caesarian Section—The surgical removal of the baby through the abdomen.

Carbohydrates—Starches and sugars.

Catheter—A tube for withdrawing the urine from the bladder.

CELL—One of the microscopical units of which tissue is composed.

CELL DIVISION—The process of reproduction by which a single cell divides into two cells.

CEPHALIC—Pertaining to the head.

CERVIX—The neck or lower end of the uterus.

CHORION—The outermost portion of the fetal membranes.

CHROMOSOMES—A cell substance which stains readily and is thought to contain the ancestral characteristics.

CHRONIC—Old; long continued.

CILIA—Hairlike processes of cells.

CLINICAL—At the bedside.

COLOSTRUM—The fluid secreted by the breasts following birth and preceding the secretion of milk.

CONCEPTION—The impregnation of the ovum by the sperm cell. The beginning of pregnancy.

CONGENITAL—A characteristic occurring before birth.

CONTRACTION—The shortening of the muscle fibers of the uterus, particularly at the time of delivery, which causes pain.

CONVULSION—A spasm or involuntary contraction of the muscles.

CREDÉ—Method of expelling the placenta. Forcibly squeezing the placenta out of the uterus.

CURET—A spoon for scraping the uterus.

DELIVERY—The birth of the child.

DIAGNOSIS—The process of determining the nature of the disease.

DOUCHE—The cleansing of a body cavity by a stream of water.

DUCT—A tube for the passage of a secretion.

ECLAMPSIA—Convulsions of pregnancy.

ECTOPIC—Out of the normal situation. Outside the uterus.

ELIMINATE—To get rid of waste material.

EMBRYO—The new life before it has assumed definite form; during the first twenty-eight weeks.

ENEMA—Fluid injected into the lower bowel, either for food, or for evacuation.

ENGAGEMENT—The fitting of the fetal head into the brim of the pelvis.

EXCRETION—The process of ridding the body of waste material.

EXPULSION—To force out.

FALLOPIAN TUBES—The oviduct or tube leading outward from the uterus to convey the ova to the uterus.

FECES—The excrement discharged from the bowels.

FETUS—The unborn child from the end of the twenty-eighth week until birth.

FORCEPS—A two-bladed instrument for extracting the child.

FUNCTION—The special duty of an organ.

FUNDUS—The body of the uterus apart from the cervix.

GASTRIC—Pertaining to the stomach.

GENITAL—Pertaining to the organs of reproduction.

GERMINAL CELLS—The early stages of the ovum or sperm cell.

GESTATION—Pregnancy.

GLAND—An organ of the body whose chief function is to secrete fluid.

GRAAFIAN FOLLICLE—Small round bodies in the ovary where the ovum develops.

GYNECOLOGY—The study of women's constitution and diseases.

HORMONE—A ferment in the blood.

HYGIENE—The preservation of health.

IMPREGNATION—The act of making pregnant.

INFECTION—The communication of disease as by contact with bacteria.

INSOMNIA—Inability to sleep.

INTESTINE—The bowel. The digestive tube from the stomach to the anus.

INVOLUTION—The return of an organ to its natural state.

KNEE-CHEST POSITION—Resting the chest and knees with the hips elevated.

LACERATION—Tearing of the soft parts.

LACTATION—The secretion of milk.

LAITY—Those outside the medical profession.

LANUGO—The fine hair covering the body of the fetus.

LAXATIVE—A mild cathartic.

LEUCORRHOEA—The whitish discharge from the vagina.

LIGHTENING—The sinking of the child's head into the pelvis. Occurs about two weeks before birth.

LOCHIA—The vaginal discharge following delivery.

LUNAR MONTH—Twenty-eight days.

MAMMARY—Pertaining to the breast.

MANUAL—Performed by the hands.

MATERNITY—Motherhood.

MECONIUM—The dark green material found in the large intestine of the new-born infant.

MEMBRANE—A thin layer of tissue.

MENSTRUAL—Pertaining to the monthly flow of blood from the uterus.

MISCARRIAGE—The expulsion of the fetus prior to the seventh month.

NAUSEA—Sickness at the stomach.

NEUROTIC—Nervous.

NORMAL—Natural.

NUCLEUS—A small dense area found in every cell which governs its life.

OBSTETRICS—The branch of medicine which deals with pregnancy, and childbirth.

OVARY—The female sex gland which contains the eggs or ova.

OVIDUCT—The tubes which carry the ovum to the uterus.

OVUM—An egg.

PALPATE—To feel with the hand.

PATHOLOGY—The science which deals with the process of disease in the body.

PELVIC FLOOR—The soft tissue that forms the bottom of the pelvis.

PERINEUM—The soft parts extending backward from the vagina to the rectum.

PERISTALSIS—The wave or wormlike movement of the intestine.

PESSARY—An instrument placed in the vagina to support the uterus.

PHYSIOLOGY—The science which deals with the functions of the living body.

PIGMENT—Coloring matter.

PLACENTA—The afterbirth. The cakelike mass which establishes a communication between mother and child.

PREGNANT—With child.

PREMATURE—Occurring before the proper time.

PREMONITORY—A warning.

PRENATAL—Before birth.

PRIMIPARA—A woman in first labor or after first labor.

PROGNOSIS—A forecast as to the probable outcome.

PROLAPSE—The falling-down of an organ.

PROPHYLAXIS—Preventive treatment.

PROTEIN—A foodstuff which contains nitrogen, like meat or albumin.

PROTOPLASM—The living substance of cells.

PUBERTY—Sexual maturity, usually occurring at the thirteenth or fourteenth year.

PUBIS—A part of the pelvis.

PUERPERIUM—The lying-in period.

QUICKENING—Feeling life. The first perception of fetal movement.

RICKETS—A disease of infancy characterized by softening of the bones.

SECRETION—The fluid substance elaborated by a gland.

SEMEN—The fluid from the male generative organs.

SPERMATOZOON—The male reproductive cell.

STERILIZATION—The process of freeing an object of bacteria.

STILL-BORN—Born dead.

SUTURE—A surgical stitch.

TAMPON—A plug of cotton.

TERM—The natural end of pregnancy or expected date.

THERAPEUTIC—Curative; treatment of disease.

TISSUE—The combination of cells to form a body structure.

TOXEMIA—Toxins in the blood.

TUBES—Oviducts or fallopian tubes.

UMBILICAL—Pertaining to the navel.

URINE—The secretion from the kidneys.

UTERUS—The womb. The muscular organ in which the fetus is incubated, nourished, and expelled from the body.

VAGINA—The hollow tube extending from the uterus to the outer world.

VERNIX CASEOSA—A fatty substance covering the skin of the new-born child.

VITAMIN—A food substance whose chemical composition is unknown, but a necessity of life.

WHARTON'S JELLY—Soft tissue of umbilical cord.

WOMB—The uterus.